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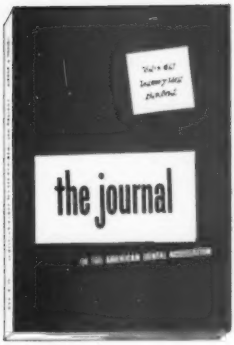

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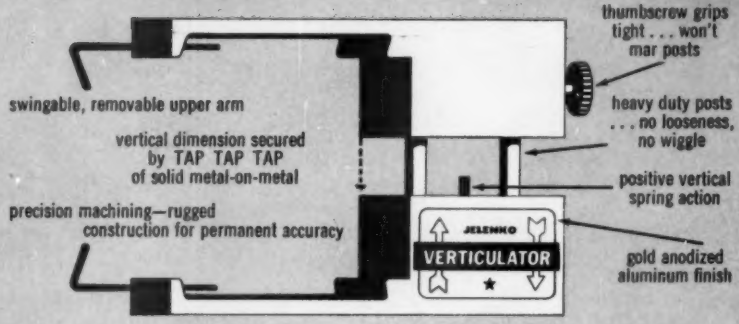
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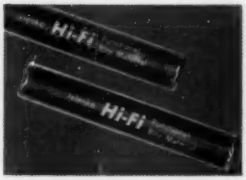

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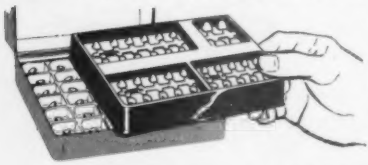

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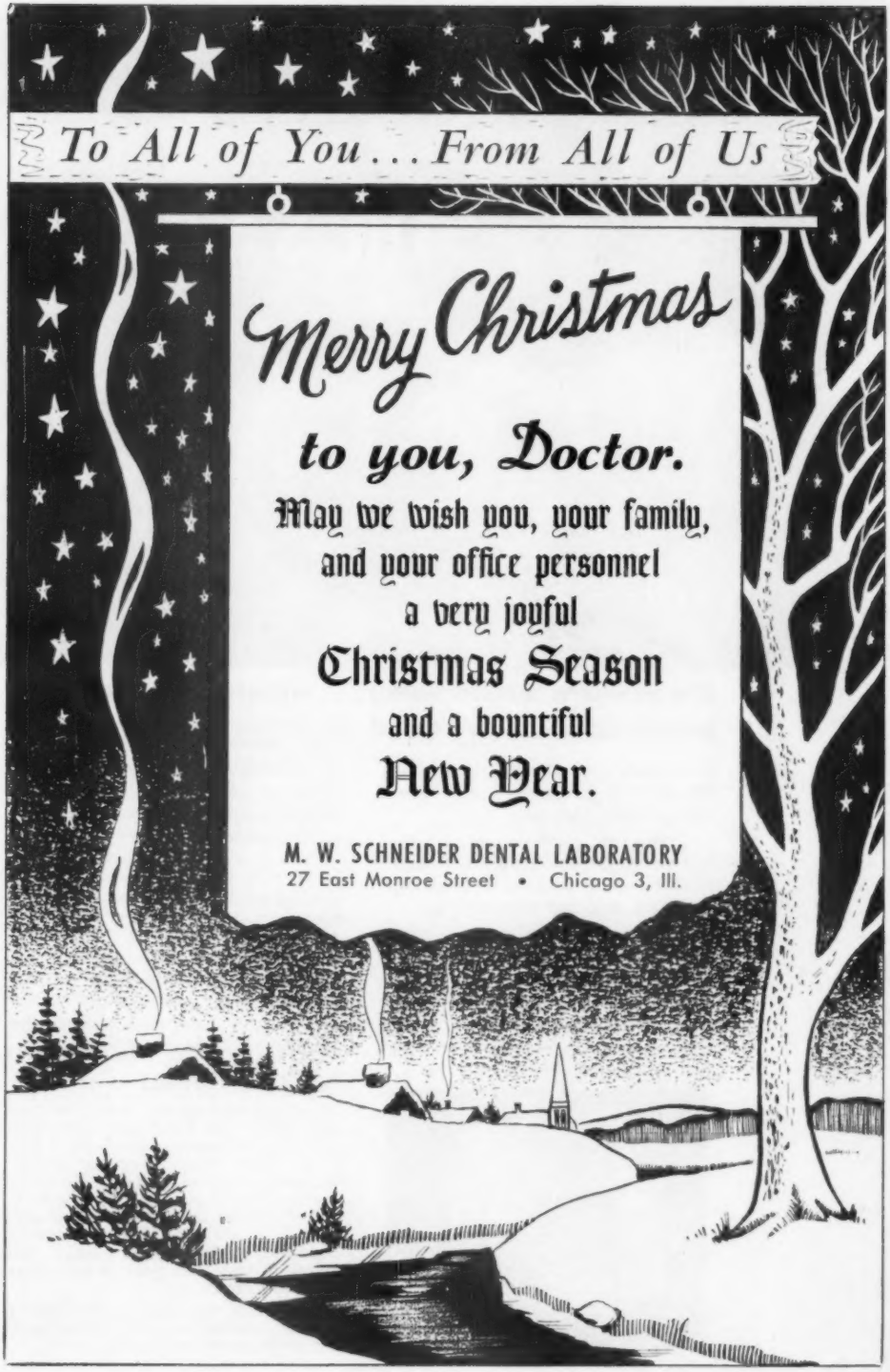
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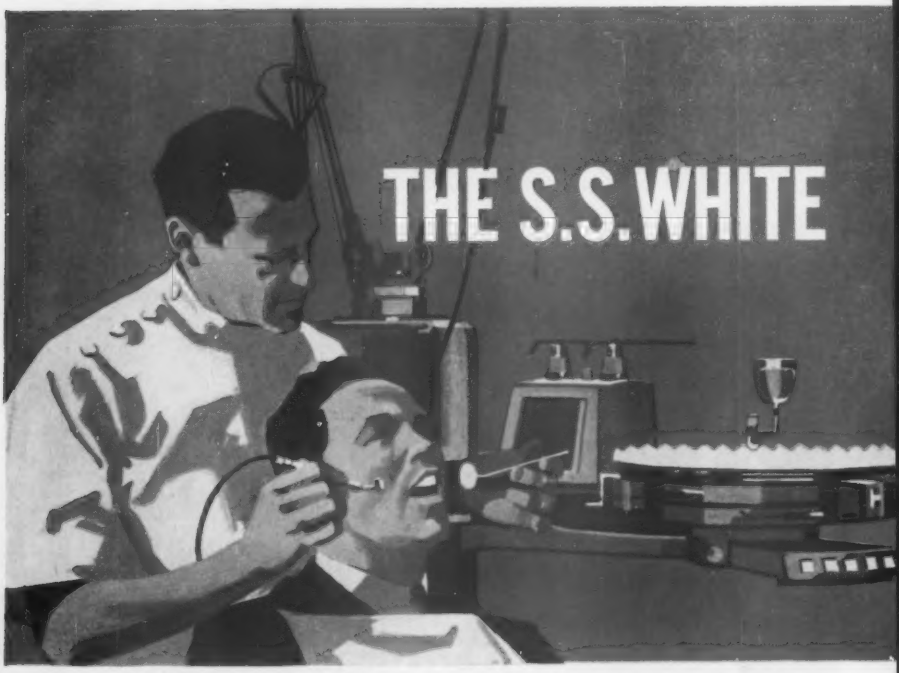

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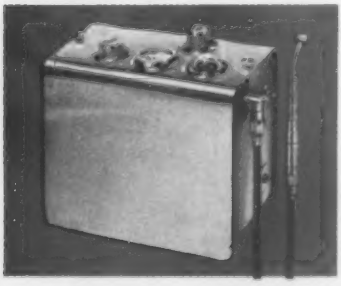

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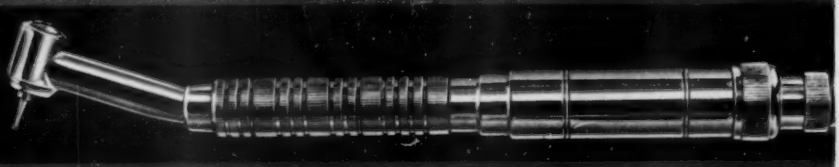

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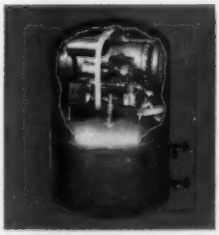

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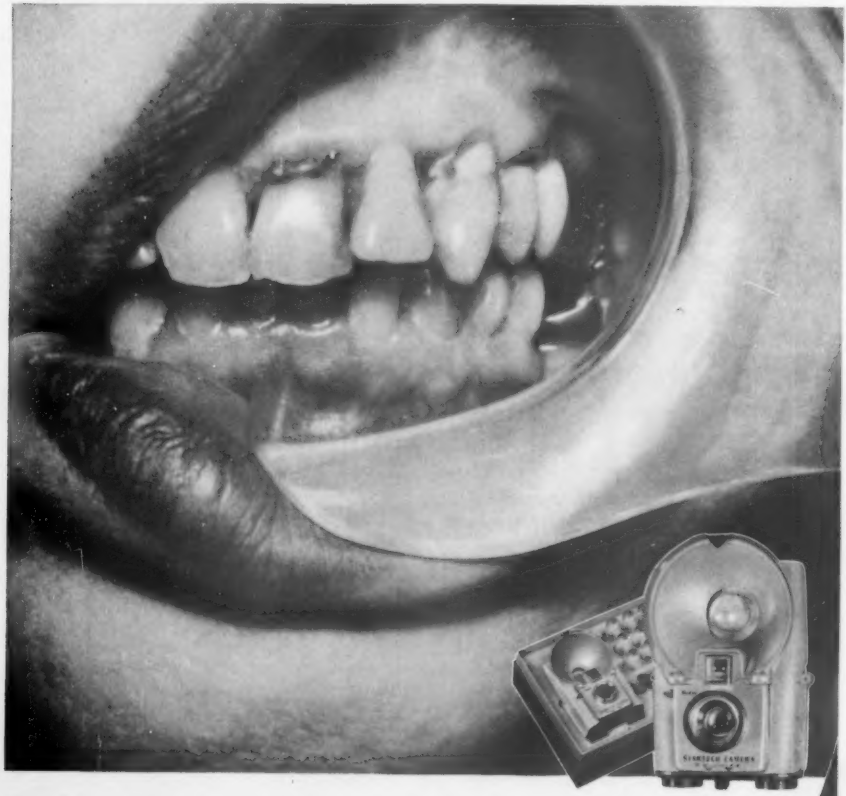

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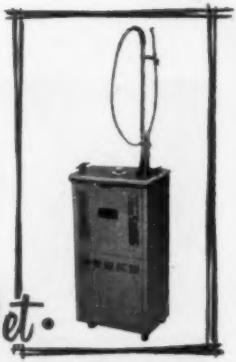

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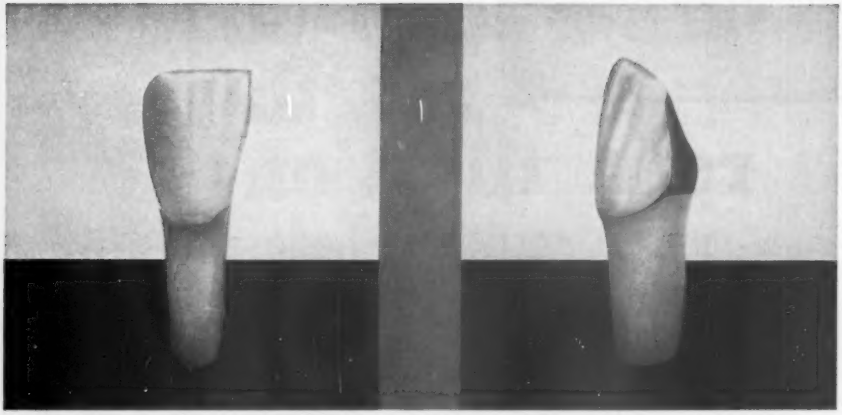

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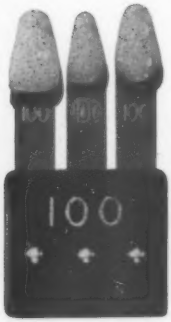

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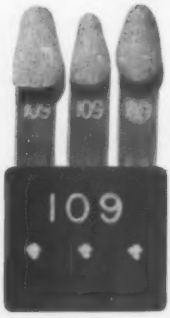

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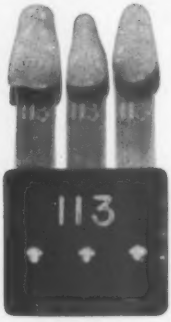

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Traumatic capacity of high-speed and ultrasonic dental instrumentation

Harold R. Stanley, D.D.S., M.S., Bethesda, Md.*

The Council on Dental Research, motivated by concern over the safety of newer technics for cavity preparation, invited the preparation of this critical review. The article evaluates the published histopathologic studies of the response of the pulp to high-speed and ultrasonic instrumentation. The author concludes that these technics are biologically acceptable when adequate precautions, which he discusses, are observed by the operator. The review summarizes available knowledge of the important biological considerations, and indicates where further investigation is required. The Council believes that this authoritative commentary merits the careful attention of all who are interested in the rational application of high-speed and ultrasonic devices in clinical practice.

In order to obtain a meaningful evaluation of the histopathological changes which occur in human pulp tissue under the traumatic influences of modern instrumentation, it is necessary to make a preliminary survey of the literature on the subject accumulated prior to the high-speed and ultrasonic era. This approach is especially indicated in view of the inherent difficulties in preservation, preparation, and interpretation of the particular type of histopathological specimens involved.

Although the art of pulp study and interpretation was greatly handicapped by the lack of effective histologic technics, technical improvements in recent years have eliminated many of the more common artifacts. Also, the need for a three dimensional perspective in order to interpret intelligently the vagaries of pulpal histology has been realized.

Concepts regarding the function of the pulp in fully erupted teeth have changed considerably since the end of the nineteenth century. This change is illustrated

by comparing the operative technics of that era, which advocated destruction of the pulp even in minor procedures, to the often complex methods used by modern dentists to preserve this tissue.

The nineteenth century belief that the pulp of a fully formed tooth served no further function[1] found ready advocates for pulpectomy[2,3] of normal teeth used as bridge abutments in order to prevent future episodes of pulpitis.[4] However, as early as 1891 Miller[5] pointed out that the mouth was an incubator of pathogenic organisms and suggested that they might play a role in various disorders of the body. W. Hunter[6] in 1900 propounded a similar genesis of many systemic diseases. Billings[7] in 1909 reported a case of chronic infectious endocarditis in which the source of infection was considered an alveolar abscess. It was not until 1910, however, after Hunter's[8] famous lecture on oral sepsis at McGill University, that a wave of reaction spread throughout the dental profession. Although pulpless teeth were not mentioned by either Hunter or Billings, millions of pulpless teeth were nominated as focal points of infection for most of the systemic ills of man without positive clinical or roentgenographic evidence[9-11] of focal lesions.

To stop this needless destruction of the oral cavity as a functional physiological unit, the dental profession next proposed that every effort be made to maintain the health and vitality of the pulp. Many procedures in operative dentistry underwent careful scrutiny in order to eliminate or modify those steps which were possibly harmful to the pulp.[2] Thus began the era of pulp conservation.

Although considerable clinical evidence had been accumulated by 1932, very few histopathological studies of the dental pulp had been conducted.[12] Black[13] taught that pain-producing procedures caused pulpal hyperemia. Teeth heated or chilled to induce severe pain and then extracted at the peak of discomfort revealed engorged blood vessels. He listed several causes of hyperemia: heat generated while polishing fillings, heat-conducting metallic fillings placed over nearly exposed pulps, large fillings in broad contact with many dentinal tubules even in the absence of extreme temperature changes in the mouth, and the grinding away of enamel of a vital tooth even while using a jet of water.

In 1899, Jack[14] determined the highest and lowest temperatures that would not cause discomfort to healthy teeth of patients. Consequently, the clinicians of that period became very aware of the phrase "hyperemia of the pulp" and associated all subjective dental pain with hyperemia. Any procedure causing pain was assumed to induce hyperemia and possibly permanent pulpal damage. The traumatic effect of drilling was considered to be minimal if the cavity could be cut painlessly without the use of anesthesia.

From this time on, pulp studies tended to fall into three categories, singly or in combination: (1) clinical studies on teeth in vivo; (2) thermocouple studies; (3) histopathological studies. The histopathological studies will be emphasized in this review.

PULP STUDIES OF LOW-SPEED ERA

In the 1920's, the great number of pulps becoming necrotic beneath silicate cements stimulated a group of animal experiments. Wannemacher[15] in 1928 appears to have carried out the first human study. Thoma[16] in 1925 initially showed that pulp tissue could respond to irritation with all the characteristics of the inflammatory process. Until then it had been assumed that pulpal tissue differed from other mesenchymal tissues and lacked this capacity. Fish's work[17] on monkeys in 1931 stands out as a landmark.[18] He found that injury to the dentinal fibrils caused a reaction at their pulpal ends and the reaction was always confined to the pulpal surface of the in-

jured tubules, where reparative dentin eventually formed. Manley recommended that clinically and biologically the dentin and pulp should be regarded as one tissue. Confinement of the pulpal reaction to cut tubules appeared to be the rule until Shroffs' work[15] with synthetic porcelain and Lisanti and Zander's work[19] with heat revealed more extensive lesions.

Fish,[17] and Van Huysen and Gurley[20] found responses beneath unfilled cavity preparations more severe than those under fillings. Manley,[18,21] Fasoli,[22] Van Huysen and Gurley,[20] and James and Diefenbach[23] agreed that there was a direct relation between cavity depth and degree of pulpal reaction. Gurley and Van Huysen[24] emphasized that the most important factor affecting the severity of pulpal response was the distance between the cavity floor and the pulp. James and Diefenbach[23] were the first in the English literature to measure this distance precisely in tenths of millimeters and emphasized the pulpal reactions found in that section of a series which showed the deepest part of the cavity. In 1946 Shroff,[15] having adopted the term "effective depth" for this measurement, generally found that cavities having an effective depth greater than 0.5 mm. would eventually induce the formation of reparative dentin. If the distance between the cavity floor and the pulp was less, the picture was one of progressive destruction of more and more pulpal tissue. Differences of 0.2 mm. in the thickness of the remaining dentin produced notably different pulpal reactions. His control specimens revealed considerable injury induced solely by the act of cavity preparation. Shroff pointed out that although the pulp might already have been sealed with reparative dentin as a result of the caries process, in all cavity preparations large numbers of sound and healthy tubules, unlined by such dentin, would be opened and placed in contact with filling materials.

Fish[17] demonstrated that focal hemorrhages, not interspersed with inflammatory cells, could be found in experimental teeth extracted after several weeks without evidence of absorption, phagocytosis, or pigment formation. Also, normal control teeth occasionally showed minute foci of escaped red cells. He did find, however, that hemorrhages were more certain to occur under the more extensive preparations. He described capillary invasion of the odontoblastic layer associated with a round cell invasion in older, four week, specimens. Little did he realize that future pulp studies would reveal capillary invasion of the odontoblastic layer as early as 24 hours after cavity preparations. His work demonstrated the need for distinguishing between newly formed capillaries and those already present but nonfunctioning.

Seelig[25] in 1950 showed that blood plasma diffusing through capillary walls produced an eosinophilic coloring of the ground substance. He considered this change the first stage of inflammation.

In 1952 Shroff[26] emphasized that claims based on clinical evidence were extremely unsatisfactory and unreliable with regard to pulpal pathology. Although detailed descriptions of pathological states resulting from experimental procedures are not necessary, it is important to learn whether the procedure is or is not irritating to the pulp.

He further pointed out that in human studies careful selection of both subjects and teeth is necessary because of the many variable factors. Pulpal reaction to the same irritant varies not only between different individuals, but also between different teeth in the same mouth. Individual peculiarities make it mandatory, in order to obtain conclusive results, that large numbers of both experimental teeth and subjects be employed.

He indicated a need for a control filling material which permits differentiation between pulpal effects due solely to cavity preparation and those due to the filling material itself. Fortunately an ac-

ceptable standard of comparison can be obtained with ZNOE (zinc oxide & eugenol). Amalgam should not be used as a control because of its proved irritating nature.[15,21] Shroff recommended that each worker report in detail his method of operation, use of an anesthetic, rubber dam, cutting speed, pressure, and so forth. Lack of this information lessens the value of the work and makes it impossible to repeat experiments satisfactorily for confirmation. Differences in histological appearances may be brought about by variations in extraction and fixation technics. The pulp of a tooth extracted under the influence of a vasoconstricting anesthetic and immediately fixed may present an ischemic appearance quite different from that of one removed under a general anesthetic.

In the same year, Kramer and McLean,[27] reporting work on a large number of teeth, also showed an appreciation for the necessity of establishing a systematic method of assessing pulpal responses. They recorded not only the presence and location but also the severity of pulpal reactions. The intensity of the cellular infiltration, the degree of displacement of odontoblasts and the thickness of the reparative dentin were recorded as: +, ++, +++ and so on. Being aware of numerous nonspecific characteristics which could not be established as part of a reaction pattern in their results, they de-emphasized hydropic changes in the odontoblasts, eosinophilic zones unrelated to the area beneath the cavity preparation, and focal hemorrhages, since these characteristics could all be found in nonprepared teeth.

Thermal shock, long discussed and assumed as deleterious to the pulp since the late 1800's, was experimentally produced and demonstrated by Lisanti and Zander[19] in 1952. Elevations in temperature were produced by a device designed to apply heat to the floor of a previously prepared cavity in dogs. They determined in vivo the temperature rise in the pulp tissue resulting from heat transmission through various thicknesses of dentin beneath the floor of the cavity preparation and also observed the histopathologic changes resulting from the application of the same temperature. The application of temperatures as high as 600°F. for ten seconds resulted in massive destruction and blister formations in the pulp with lesions extending far beyond the cut tubules.

In 1953 Van Huysen and Boyd[28] stressed the absolute necessity for serial sections in order to rule out unequivocally the minute exposures that can go undetected in semiserial sections. They felt that hyperemic and congested capillaries, as described by Black, could not be accepted as reliable criteria for pulp damage since they could be found in normal control teeth.

James and Schour[29] in 1955 established a comparative index of response based on the degree of inflammatory reaction multiplied by the percentage of incidence. This study revealed that the degree of irritation produced could be evaluated more accurately when the cavity preparations were deep. In 1959 James, Schour and Spence[30] improved further on this coding method.

PULP STUDIES OF HIGH-SPEED ERA

Although the high-speed rotary era was introduced in 1920 when Huet[31] demonstrated the advantages of a handpiece running at 10,000 rpm, it was not until 1949 when Walsh and Symmons[32] built a turbine operating at 60,000 rpm that there was any real impetus in this direction. At this time, concern was expressed over possible pulpal reactions to these increasing speeds, but the first mention of a histopathological study relative to the problem did not appear until 1956.[33]

In 1957, Langeland[34] published the first complete report of a comparative histopathological study of pulpal responses produced by a conventional low-

speed (6,000 rpm) and an air-turbine high-speed (50,000 rpm) handpiece. Forty-seven human teeth were prepared, 15 at 50,000 rpm, 32 at 6,000 rpm, which were extracted within 20 minutes.

Langeland considered odontoblastic displacement the only histologic feature that could be recorded with certainty. The method of cavity preparation was considered noninjurious if displaced odontoblasts were not found. This feature occurred in all instances in which the preparations were carried out under an air stream but only in exceptional cases when the cavity was kept wet. He found no difference with either instrument, but the water jet, or spray, greatly minimized the incidence of displaced odontoblasts at both speeds.

Two studies with very similar results appeared in March 1957. Marsland and Shovelton[35] reported on 34 human teeth prepared at speeds from 500 to 15,000 rpm. The teeth were extracted immediately and at intervals up to 38 days. Except for the immediate specimens, the cavities were restored with ZNOE. The cutting, using carbide or steel burs, was a continuous operation, lasting 15 to 90 seconds.

These investigators found that the degree of immediate damage from cavity preparation was greater with increased speed, that is, up to 15,000 rpm. From 5,000 to 15,000 rpm the lesions beneath cavities prepared without a coolant extended beyond the cut tubules. The appearance of heat fixation gave the pulp a "burned" look. In this situation odontoblastic displacement was reduced as compared to displacement in those lesions resulting when the lower speeds were used. It was assumed that the severity of these lesions was due to thermal factors since these histological disturbances were not found when coolants were used. These findings also indicated that the thermal damage with steel burs was greater than with carbide burs.

Swerdlow and Stanley[36] prepared Class V cavities in 60 human teeth with an inverted cone diamond stone (no. 37) at 20,000 rpm, with and without an air-water spray. Except for the teeth extracted during the first hour, all others were restored with ZNOE and extracted at intervals up to 36 days. In contrast to the method used by Marsland and Shovelton,[35] intermittent rather than continuous grinding was used when the teeth were cut without a spray. The remaining dentin thicknesses (Shroff's effective depth) were measured. Lesions in the less-than-one-hour specimens, when present, were very slight and similar in both the "with spray" and "nonspray" categories.

By comparison, in the later time intervals the "nonspray" specimens revealed a more acute and prolonged pulpal response. Three specimens in this category revealed abscesses and several others had actively expanding lesions which could have developed into abscesses if a longer time interval had been provided. When a coolant was used, the floor of the cavity preparation could be extended much closer to the pulp tissue without inducing abscess formation, even with a remaining dentin thickness of 0.3 mm. The boundaries of the "with spray" lesions coincided approximately with the cut tubules but 15 of the "nonspray" lesions, possessing the burn characteristics described by Marsland and Shovelton, extended beyond the cut tubules.

In February, 1958 Bernier and Knapp[37] reported using diamond stones and a water spray in preparing ten cavities in two dogs and six in human teeth. Their instruments consisted of conventional straight and contra-angle handpieces which ran up to 26,000 rpm and several high-speed handpieces, the Turbojet (45,000 rpm), the Midwest (40,000 rpm), the Imperator (26,000 rpm), and the Page-Chayes (100,000 rpm). Although the exact running speed was not given, the conventional handpiece apparently was not operated at the ordinary standard speed of about 6,000 rpm. All

teeth were restored with amalgam. One dog was sacrificed at 2 days, the other at 12 days. The human teeth were extracted at 2, 7, and 14 days.

With the high-speed instruments, including the conventional handpiece running up to 26,000 rpm, they observed a new type of lesion which they termed the "rebound response." This response occurred in a region directly across the pulp from the cavity site or at a site distant from and unrelated to the cut dentinal tubules. It was manifested by any combination of the following features: a change in the ground substance, edema, fibrosis, odontoblastic disruption, and reduced predentin formation. It was found in 100 per cent (5) of the dog teeth examined after two days and 80 per cent (4) of those examined after 12 days.

This response appeared to be primarily an alteration in the ground substance, such as the beginning of a necrotic change, with a concomitant stage of fibrosis and without an intervening exudative phase. The ground substance contained small fragmented and rounded, smooth, granular, eosinophilic bodies in a coarse reticular network. Many of the eosinophilic bodies appeared to lie in lacunae. Hyaline-like, eosinophilic regions were often found as a background for some of these changes. It seemed possible, but unlikely, that the smooth granular bodies were a terminal phase of degenerated erythrocytes.

The unique location of the "rebound response" to rotary cutting led to speculation that the waves of energy transmitted to the pulp were focused into a certain region by the structure and contour of the pulpal walls. The response was similar regardless of the instrument used and varied little in intensity and distribution in the sections made either at 2 or 12 days after operation. The possibility that high speed, alone, may be the precipitating factor of the "rebound response" gave cause for reflection on the use of high speed, even though its ultimate effect on the pulp vitality remained to be determined. They pointed out that although these responses did not necessarily indicate serious harm to the pulp, the possibility existed that if misused, the high-speed dental instrument, like any other instrument, could cause irreversible damage.

Three of the six human teeth also revealed a peculiar lesion morphologically resembling a circumscribed focus of degeneration. The distinct outline of the lesions suggested localization of the physical agent which produced this peculiar change. Bernier and Knapp considered it probable that the circumscribed focus of degeneration was another manifestation of the "rebound response" seen in the dogs.

In March, 1958 seven reports appeared in the literature concerning the effects of high speed. Zach and Cohen[38] prepared 36 cavities in the teeth of monkeys with the Page-Chayes instrument (140,000 rpm) using a no. 36 carbide bur. The animals were sacrificed after 30 days and a distinct almost linear correlation was found between the bulk of dentin removed and the pulpal reaction. They also observed an unusual degenerative response of odontoblasts on the opposing pulpal wall (opposite the region of directly cut tubules). They postulated that a possible cause of this response was harmonic vibration induced by extremely high rotary speeds.

Swerdlow and Stanley[39,40] prepared 53 human teeth with the Page-Chayes equipment (150,000 rpm) using a no. 35 carbide bur. They compared these results with the results of their previous study at 20,000 rpm and found that the responses induced by the Page-Chayes instrument were less severe even though the average remaining dentin thickness of the high-speed specimens was smaller. They also noted the presence of an increased eosinophilic staining beneath the cut tubules in 13 instances.

Lefkowitz, Robinson and Postle[41] published the results of a study of 249 cavities prepared in the sound teeth of dogs and humans in which low speed, high speed, air abrasive and ultrasonics were compared. Of this number, they prepared 17 human teeth and 16 dog teeth at low speed (5,000 rpm) and 12 human and 58 dog teeth at high speed (24,000 rpm). The cavities were prepared to an optimum depth of 0.5 and 1.0 mm. pulpal to the dentinoenamel junction. All cavities included the entire width of the buccal or labial surfaces and were restored with ZNOE. The teeth were removed at 1, 7, and 28 days. When cavities were prepared at both low and high speeds, no histological evidence of injury was found. They advocated that experimental cavities be prepared to an optimum depth to help standardize the evaluation of pulpal response to cavity preparation. The adverse pulp reactions after cavity preparation beyond optimum depth must be construed as evidence of injury caused by depth of preparation rather than the effect of instrumentation alone. In the absence of caries, temperature rise in preparation, and chemical injury by filling materials, the only factor remaining to be investigated is traumatic injury. Their study showed that traumatic injury to the pulp is minimal and reversible when optimum cavity depth and thermogenetic factors are respected.

Nygaard Østby[42] demonstrated that the Borden Airotor, running at top speed (250,000 rpm) and with maximum water spray, produced no deleterious effect on the pulp. The pulpal reactions were less noticeable as compared to those observed when the conventional engine (6,000 rpm) was used without a water spray.

In July, 1958 Shovelton and Marsland[43] published some follow-up results after utilization of speeds up to 37,000 rpm. Human teeth were cut either with no. 558 carbide burs or cylindrical diamond instruments. They found that the no. 558 carbide bur could produce burns and other extensive lesions when used uncooled up to speeds of 22,000 rpm, but that very little pulpal disturbance was observed when a coolant was used. Cutting periods were continuous, varying from 17 to 75 seconds. The results indicated that pulp damage became progressively more severe as the cutting speed was increased up to 37,000 rpm without coolants. With speeds up to 30,000 rpm, carbide burs with properly used coolants produced negligible pulpal damage. The effects of uncooled diamond instruments and carbide burs on the dental pulp were very similar. Although a cooling agent with diamond instruments did not eliminate damage to the pulp completely, it did reduce the damage to such an extent that full recovery of the pulp could be expected. Uncooled diamond instruments produced a considerable degree of fibrous change with some regularity in teeth retained for extended experimental periods. When carbide burs were used this change was infrequent.

Although the immediate response was similar with both types of instruments, the teeth retained after cavity preparation with the diamond instruments showed considerable changes in the odontoblastic layer.

In the lower speed range, odontoblastic displacement occurred to a lesser extent with diamond instruments than with carbide burs. With both instruments it was noted that the cellular displacement, when it did occur in the higher speed ranges, most frequently occurred in tubules on the opposite side of the pulp horn, not directly involved in the cavity preparation.

Tylman, Spence, Weiss, and Massler,[44] in September, 1958 prepared seven anterior teeth for jacket crowns using diamond disks and diamond stones revolving at 6,000 and 20,000 rpm with and without a water spray. One side of each tooth was cut at low speed, and the other at high speed. Shallow, medium, and deep

inlay preparations were also made in 72 teeth using diamond stones and burs at speeds ranging from 3,000 to 70,000 rpm with and without a water spray. All preparations were covered with ZNOE. The teeth were extracted after 48 hours or 7 days.

Shallow, jacket-type preparations resulted in little or no pulpal damage. The changes were not significantly different from those observed under much less extensive, shallow inlay preparations. Pulpal damage was progressively more severe as the inlay preparations became deeper. Absence of a coolant had no significant effect under the jacket preparations or shallow cavities but resulted in more severe pulpal damage under deep cavities. Pulpal damage was more severe under cavities prepared at speeds above 16,000 rpm than those prepared at speeds under 6,000 rpm. It was concluded that pulpal damage in human teeth was more directly correlated with cavity depth than with extent or width of the preparation.

In October, 1958 Bruner[45] prepared cavities in 17 human teeth at speeds in excess of 150,000 rpm and at conventional speed and found very little difference in the pulpal response to either type of operative procedure.

In February, 1959 Bernier and Knapp,[46] continuing their studies of high-speed preparations on young dogs, again emphasized the "rebound response" but stated that the selection of this term in no way implied a factor of causation. They reasoned that with high-speed instruments there could be an extensive transmission of energy into the pulp chamber which transcends those forces that would normally localize such effects at the base of the cavity. One could also assume that the physical characteristics of the chamber might influence the point of localization. An assessment of the cyclic quality of the sound vibrations peculiar to high-speed instruments seemed a likely place to begin, in that the "rebound response" seemed similar, at least histologically, to changes seen in teeth subjected to ultrasonic vibrations.[47]

Another new response which they considered an immediate one, was "varicosity," the formation in the pulpal tissue of "large air-filled spaces" devoid of any lining cells. It appeared that high-speed instrumentation produced a greater range of pulpal changes, some of which may be more severe than those produced with low-speed devices. Knapp[47] had found earlier, in teeth prepared with the Cavitron instrument, cystic spaces lined by mesenchymal cells and assumed that they were caused by edema.

In May, 1959 Stanley and Swerdlow[48] presented the results of a comparative study on over 450 teeth of eight operative technics ranging in speed from 6,000 to 200,000 rpm. Class V cavity preparations were made and restored with ZNOE. The specimens were extracted at intervals of less than one hour to 132 days. Comparisons were made by recording the incidence and intensity of several specific histopathologic characteristics.

Speeds of 50,000 rpm and over, with instruments utilizing the belt-driven or turbine principle with coolants, were found to be less traumatic to the human pulp than speeds of 6,000 to 20,000 rpm with the conventional ball-bearing handpiece. The value of coolants became more significant at the higher speeds. In the absence of adequate coolant, intermittent grinding was of no appreciable benefit when cutting with diamond stones. Preparation time at the higher speeds was of little consequence provided frictional heat was controlled by adequate cooling. The combination of high speed, controlled temperature, and light load was conducive to the production of minimal pathologic pulpal alteration.

In the less-than-one-hour specimens, disruption of the odontoblastic layer with shallow displacement of odontoblasts represented the only pathologic alterations found. In the absence of adequate coolants these characteristics were more

conspicuous, but no inflammatory cells were found regardless of the thickness of the remaining dentin.

Lesions extending beyond the cut tubules were found when those technics were employed with inadequate coolants. Also, the greatest incidence of reparative dentin occurred in these same groups. The incidence of reparative dentin in the lower speed categories did not approach the low incidence seen in the high-speed categories when adequate coolants were used, even when the specimens in the low-speed categories possessed greater average remaining dentin thicknesses.

Stanley and Swerdlow[49] later demonstrated that coolants, although adequate to prevent burn lesions, did not minimize inflammatory responses when the operative technic required an applied force above 8 ounces. Their results had corroborated Peyton's findings[50,51] that frictional heat was readily controllable even at the higher speeds. Only 7 specimens of 400 prepared with an air-water spray revealed evidence of excessive temperature rise. With frictional heat being controlled, the presence of pulpal pathology was explained on the basis of differences in applied pressures determined by the design of the instrument and the requirements of the operative technic. Previously they had shown that the prevalence of cellular infiltration and cellular displacement was greater when lower speed technics rather than the higher speed technics were used, regardless of whether an adequate coolant was employed. Burn lesions produced at high speed were not generally characterized by the phase of massive leukocytic infiltration, as seen with the lower speeds. Without this influx of leukocytes, repair began earlier and with greater ultimate success.

In November, 1959 Seltzer and Bender[52] used several speeds in preparing 15 human teeth for full crowns, then extracted them immediately. Two teeth were prepared at 5,000 to 8,000 rpm, 5 teeth at 25,000 rpm, 3 teeth at 40,000 to 50,000 rpm, and 5 teeth at 100,000 to 150,000 rpm. Their impression was that the pulpal reactions were much less severe when the teeth were prepared at higher speeds (50,000 to 150,000 rpm) than at the lower levels (5,000 to 25,000 rpm), provided copious quantities of water were used.

Swerdlow and Stanley[53] also compared the response of the human pulp to amalgam insertion and ZNOE at low and high speeds. In the high-speed categories they found that the average response to the amalgam filling was greater than the average response for the ZNOE restored teeth, but no differences in response were observed with the two restorative materials with the low-speed technics. The primary response to cavity preparation at the low speeds was sufficiently great that no additional effect due to amalgam insertion was discernible. It became clearly evident that the biologic advantage, expressed in terms of minimal responses, associated with the high-speed technics was decreased or absent when amalgam was inserted on dentinal tubules which were not underlaid pulpally by secondary dentin.

DISCUSSION OF PULP STUDIES OF HIGH-SPEED ERA

Langeland[33,34] found no difference between conventional rotary speed and the Dentalair (50,000 rpm); however, all his specimens were extracted within 20 minutes. Swerdlow and Stanley[36] and Stanley and Swerdlow[48] found no significant differences when comparing their specimens extracted early, regardless of speed or type of coolant. Some investigators feel that the full potential of a pulpal response cannot be predicted by looking at immediate specimens. Even 24 hours is not a sufficient length of time to predict the maximum response which will develop after a burn. Langeland[54] more recently has indicated that a pulpal reaction which started at the time of cavity

preparation may persist in the pulp tissue despite the insertion of an inert filling material. No doubt some distinction can be made with immediate specimens but older specimens provide more criteria for obvious groupings.

Stanley and Swerdlow[48] demonstrated that 20,000 rpm with a diamond stone and without a coolant was the most traumatic operative technic, even with intermittent cutting—more so than 6,000 rpm without a coolant. Marsland and Shovelton[35] showed that the damage increased as the speed increased up to 15,000 rpm. Using operating speeds from 5,000 to 15,000 rpm and up to 37,300 rpm without a coolant produced lesions extending beyond the cut tubules. Stanley and Swerdlow found this to be true at all speeds when no coolant or just an air jet was used with diamond stones and at high speed with carbide burs. Marsland and Shovelton were able to produce burn lesions with an uncooled no. 558 carbide bur, but Stanley and Swerdlow were not able to with an uncooled no. 35 carbide. However, Marsland and Shovelton employed continuous cutting whereas Stanley and Swerdlow employed intermittent cutting.

Shovelton and Marsland,[43] as did Swerdlow and Stanley[36] and Stanley and Swerdlow,[49] demonstrated that odontoblastic displacement was less pronounced within the cut dentinal tubules in the presence of burn or extensive lesions. Displacement also occurred to a lesser degree with diamond instruments than with carbide burs. Shovelton and Marsland also noticed that when displacement did occur at the higher speed, it occurred in the tubules on the opposite side of the pulp and not directly involved in the cavity preparation. Similarly, Swerdlow and Stanley noted in their 20,000 rpm, nonspray specimens, that all the missing odontoblasts in the region of the cut tubules could not be explained on the basis of displacement. When displaced odontoblasts were not found in the cut tubules, they were found beyond the cut tubules, even on the opposite surface. The reason for this condition is that the odontoblasts beneath the cut tubules were destroyed by the burning process and so could not be displaced. However, as the postoperative intervals increased, the lesions, resulting from burning, expanded beyond the cut tubules to involve a greater portion of the pulp and with more odontoblasts being involved by the expanding inflammatory response, additional odontoblasts were displaced.[36, 55]

Shovelton and Marsland[43] also noticed that older specimens, prepared with uncooled diamond instruments, showed a considerable degree of fibrous change. This was explained by Stanley[56] as representing regeneration on the part of the pulp to replace the damaged tissue created by the burning episode. The increased number of fibroblasts was often accompanied by many mitoses.

Shovelton and Marsland appreciated the fact that even with a coolant damage to the pulp was not completely eliminated when diamond instruments were used. Stanley and Swerdlow[49] also found this to be true but related the pulpal responses to the excessive pressure of grinding rather than to a property of diamond instruments.

In a study in which there were no pulp deaths, Lisanti and Zander[19] pointed out that the normal pulp of healthy dogs was capable of recovery from severe heat injury. A similar favorable response of the human pulp after thermal injury does not necessarily follow, since recovery depends on additional factors including the state of health of the organ at the time of the cavity preparation, the depth and extent of the preparation, the extent of the tissue damage and the presence of enough remaining cells capable of differentiation to effect healing. Lisanti and Zander emphasized that in cutting their preparations under an air stream, extreme care was taken to eliminate undue pressure and friction. The studies of Shovelton

and Marsland[43] and Stanley and Swerdlow[49] possibly shed some light on the successful results obtained by Lisanti and Zander. Stanley and Swerdlow found that healthy pulps were more apt to recover from burns induced by a high-speed, low-pressure technic and indicated that this recovery was influenced favorably by the frequent absence of a massive influx of leukocytes into the damaged region which they believed adversely affected healing in the injuries produced by low-speed instrumentation.

The investigators who cite Lisanti and Zander's work as an indication that frictional heat is of no consequence in pulp damage and repair are on untenable grounds. Sullivan[57] in July 1955, in referring to their work, expressed doubt as to the importance of frictional heat in terms of injury to the pulp and stated that the subject of damage to the pulp caused primarily by mechanical and temperature abuses should be re-evaluated.

Murphy[58] in 1957 also referred to this same treatise and interpreted it to mean that irreversible pulp damage never resulted from the heat produced by rotary burs alone. He assumed that previous concepts might well be in error since the protective ability of the pulp has been underestimated. Fortunately, he emphasized that even though the healthy pulp tissue appeared capable of recovery from even the most abusive drilling procedures, nevertheless a sensible attitude toward reversible pulp damage from heat production was encouraged. In addition he pointed out that when the cumulative effects of the preoperative caries process, the operative procedures, and the postoperative irritants are considered, the pulp might well be irreversibly damaged and that this total picture should be kept in mind in considering the effects of rotary instruments.

Some investigators preferred[37, 46, 47] to use amalgam as a filling material in experimental teeth although several references in the literature describe its irritating properties. Hori[59] found that his control teeth filled with amalgam often showed no improvement after 30 days and many pulps had further deteriorated. Nygaard Østby,[42] however, was able to obtain favorable results with this material in his study of high speed. The insertion of a filling material whose irritating properties can camouflage initially favorable responses created by mildly traumatic grinding technics[53] may also explain the lack of differences in response to different operating technics in many previous studies when filling materials other than ZNOE were inserted. It would be helpful in the future if pulp studies evaluating cutting technics would employ ZNOE as the standard filling material, since the majority of previous studies have utilized this substance and several have found that it at least did not apparently compound the irritation to the pulp.[21, 24]

As recently as 1957 Langeland[34] pointed out that eosinophilic staining became particularly distinct after delayed or insufficient fixation, and low temperature fixation. He emphasized that eosinophilic staining should be considered a criterion only if sharply limited to the region subjacent to the experimental cavity and considerably stronger in intensity in that region as compared to the pulp as a whole. Zander,[60] in 1958, felt that too much emphasis was being placed on ground substance tissue alteration[37] (eosinophilic staining). According to Zander, from the information then at hand, it was impossible to decide whether this characteristic resulted from cavity preparation, extraction, preparation of the tooth for fixation, fixation itself, or even represented a postmortem change.

Few investigators have given support to the "rebound response." Shovelton and Marsland[48] at first interpreted some of their high-speed specimens as exhibiting this response. But in no instance did they find normal pulp tissue between the area beneath the cavity and the opposite side

of the chamber, whereas Bernier and Knapp did. The extensive lesions, reaching the opposite side of the chamber, also involved all the intervening soft tissue. This condition was also found in the extensive lesions studied by Lisanti and Zander,[19] Swerdlow and Stanley,[36] and Stanley and Swerdlow.[48]

Zach and Cohen[38] mentioned the presence of an unusual degenerative response of odontoblasts on the opposite pulpal wall only once in a series of reports.

Swerdlow and Stanley[39, 40] observed that the tissues involved within the eosinophilic zone appeared morphologically normal. The eosinophilic staining was present at the ends of the shortest cut tubules if there was no exudate. If an exudate was present at that site, then the eosinophilic staining was seen to one side of the shortest tubules, either above or below or in both places. The intensity of the eosinophilic staining was somewhat greater than in the amorphous material seen in the lumina of the adjacent lymphatic capillaries. Occasionally the cut dentinal tubules showed the same intense eosinophilic staining, thus indicating a flooding of the region rather than a necrobiotic change as had been indicated.[47] This reaction appeared as early as 5 days and was still found after 132 days, with no obvious change in character other than possibly an increased intensity of staining. It seemed peculiar that the characteristic was missing in those specimens in which the response was severe enough to produce an exudate. Since it occasionally occurred peripheral to an exudate the eosinophilic change may signify a milder response. A possible reason that this characteristic was found more often in the high-speed categories was because of the general mildness of the pulpal responses. One would therefore expect to find eosinophilic staining in those specimens in which more superficial cavities were prepared using the more traumatic low speeds. Such an interpretation would suggest that eosinophilic staining represents a favorable rather than a detrimental criterion.

Pohto and Scheinin[61] demonstrated in the living pulp tissue of rats that thermal irritation created by a temperature elevation of 5 to 7°C. caused an increased permeability of the blood vessels. Plasma penetrated into the surrounding tissues especially from the venules but also from the capillaries.

The peculiar lesion described in human teeth as a circumscribed focus of degeneration[37] represents one of the pitfalls in interpreting the condition of the pulp and is often found in sections of nontreated teeth. Such a configuration represents a small island of cross-sectioned odontoblasts surrounded by a portion of the zone of Weil. This feature results from sectioning through the irregular projections of the pulpal tissue which are often found.

Although the findings of Lefkowitz, Robinson and Postle[41] in their comparative study of the effects of the various technics are in general agreement, it is felt that their work would have been more significant if the experimental cavities had been prepared to a greater depth.

Nygaard Østby's[42] illustration no. 4 shows beautifully what can be accomplished with high-speed instruments when properly operated. With a remaining dentin thickness of only 30 microns, the width of about 4 to 5 erythrocytes, reparative dentin was being formed at 32 days with minimal inflammation of the adjacent pulpal tissues.

The work of Tylman and others[44] was in agreement with the results of other investigators. Like Seltzer and Bender,[52] they found less reaction when the high speeds were used in crown preparations which are relatively shallow. Pulpal damage became progressively more severe as the preparations deepened. The absence of coolant had no significant effect on the jacket preparations or shallow cavities. This agreed with the findings of Stanley and Swerdlow[48] who eliminated speci-

mens with a remaining dentin thickness of 2.00 mm. or greater because experience had shown a lack of response except in the most traumatic instrumentations. Tylman and co-workers also showed that the pulp response was more directly correlated with cavity depth than with extent or width of the preparation, which also agreed with the work of Lefkowitz and co-workers[41] and other investigators.

ERA OF ULTRASONICS

Interest in high-speed rotary instruments was temporarily sidetracked by the introduction of two unusual instruments, the air abrasive and the ultrasonic cutting instrument. Pulp studies concerned with these more radical instruments took precedence.

The air abrasive instrument went into production late in the summer of 1950[62] and the first histopathological study by Van Huysen and Boyd[28] appeared in 1953. James and Schour,[29] like the previous investigators, found no differences in pulp reaction between rotary and air abrasive technics in dogs' teeth or in human specimens.[30]

The application of high frequency mechanical vibration to dental cutting was first suggested by Hayes[63] in 1934 and again by Manly and Brudevold[64] in 1949. The latter investigators felt that the question of possible deleterious effects needed to be considered. Barth and Bulow[65] expressed the opinion that a painless dose of ultrasonic energy was a harmless dose. In 1952, cavities were first prepared in extracted teeth with the Cavitron ultrasonic industrial machine. A year later, a generator was designed with a special handpiece for dental operations. A preliminary examination in a chimpanzee and a dog revealed no differences in pulpal response due to ultrasonic, rotary, and air abrasive technics.[66]

In October 1954, Nielsen and Richards[67] reported on the construction of an ultrasonic handpiece operating at 25,000 cycles per second and their success in preparing experimental cavities in extracted teeth and in the teeth of dogs. Later, in 1955, Nielsen[68] showed, while using an abrasive slurry on extracted human incisors, that the rise in temperature was relatively small for the first 40 to 50 seconds, after which time the temperature increased more rapidly. After 70 seconds of operation, the temperature rise was 20°F.

In February 1956, Hansen and Nielsen[68] described severe irreversible changes in the growing guinea pig incisor occurring with the ultrasonic cutting instrument developed by Nielsen and Richards, but not with conventional cutting methods. Cuts were made on the labial surfaces at a point 3 to 5 mm. below the gingival margin. This experiment was repeated by Nielsen, Colby, and Scofield[69] using the commercial Cavitron and similar severe lesions occurred.

Several other investigators,[41,70-72] using both animal and human material, found no differences in the pulpal response with ultrasonic and rotary technics.

In 1956 Knapp[47] noted only reversible changes in the teeth of 15 dogs prepared with the Cavitron instrument. The cavities were restored with amalgam. Changes in dentin formation were greatest in those teeth receiving the maximum exposure. Predentin formation decreased as cavity depth increased. The effect of the ultrasonic vibration seemed to be a sudden, severe injury transcending the body's most common defense mechanism, inflammation. In three instances, eosinophilic areas were noted. Two of these he described as eosinophilic intercellular material and the third as large numbers of homogenous eosinophilic bodies resembling erythrocytes. Two of these areas occurred in the vicinity of the cavity floor. Congested blood vessels and lymph channels, vacuolization, edema, fibrosis, and in three teeth "cyst" formations were also present.

In 1957 Jensen and Sausen[73] and

Sausen and Jensen[74] demonstrated with a Cavitron on monkeys the effects of 2 to 3 ounces of pressure in contact with the tooth for 30 seconds. The lesions produced were reversible within one month. But a pressure of 4 to 5 pounds would produce not only severe sloughing and necrosis of the attachment tissues with loosening of teeth but also irreversible pulpal lesions.

In response to the anxiety created by the seemingly incriminating results produced by the Cavitron, Zach,[75] in January 1958, prepared cavities in the deciduous teeth of monkeys but found no deleterious effects on either the apical tissue of the prepared teeth or the tissues of the developing permanent successor.

In February 1958, however, Nielsen and Kennedy[76] presented additional findings on the recovery rate of guinea pig incisors after rotary and ultrasonic cutting. Every incisor exposed to rotary cutting erupted to occlusion in 14 days and subsequent changes were limited to minor enamel defects in 7 per cent of the incisors. But in 25 per cent of the teeth in which a number of parallel horizontal cuts were made with the ultrasonic instrument on the facial surfaces from the incisal edge to the level of the gingival crest, the eruption rate was seriously retarded. Later Kennedy, Buckman and Proffit[77] presented the results of a similar study in which all the rotary, air abrasive and 3 of 4 groups of ultrasonically prepared teeth presented reversible lesions. Only in a group of teeth prepared with an ultrasonic instrument vibrating at 40,000 cycles per second did major lesions of the pulp develop (in 28 per cent).

Although in 1958 Serfaty, Massler and James[78] found in rat incisors that pulpal responses to air abrasive and ultrasonic instrumentation were less clearly related to cavity depth than were those resulting from rotary cutting, Zach, Morrison and Cohen[79] found, to the contrary, that the severity of the response to ultrasonic cutting in monkeys did increase as the pulp was approached.

DISCUSSION OF ULTRASONIC STUDIES

A paper by Zinner[80] indicated that irreversible lesions developing from ultrasonic vibrations would be most unlikely. The frequency used in a dental unit, being situated at the low end of the spectrum of ultrasonic vibration (approximate range 20,000-100,000,000 cycles per second) could not be compared to the high frequency therapeutic apparatus in either physical or biological effects. At therapeutic frequencies, ultrasonic energy is beamed and concentrated into a smaller area than at lower frequencies, where the action is entirely mechanical and dissipated at the cavitating tool tip. The low absorption at the frequency of the dental unit makes it unlikely that ultrasonic heating effects are induced locally or internally when the instrument is used in the mouth. The possibility that heat may be generated in the tooth by the simple mechanical friction developed when the vibrating tip actually cuts the tooth structure must be considered. However, experiments on extracted teeth suggest that the frictional heat generated by the ultrasonic dental tool is comparable to that of the diamond tool using water as a coolant and is considerably less than that generated by either of the dry rotary tools studied. He[47] also pointed out that if the value of 100 is given for the absorption coefficient at 1,000 kc per second (which is within the recommended range for medical therapy) the relative coefficient at a frequency of 29 kc per second (frequency of the dental unit) would be 3 for soft tissue and less than 0.1 for bone or other hard substances such as enamel or dentin. Thus, it would seem that bone and soft tissue absorb relatively insignificant quantities of ultrasonic vibration.

If the amount of time for cavity preparation in the Hansen and Nielsen[68] and

Nielsen and co-workers[69] studies had been greater than 40 to 50 seconds, frictional heat would have to be considered a possible factor, but in these studies the exposure times ranged between 5 and 10 seconds.

The fact that Jensen and Sausen[73] and Sausen and Jensen[74] obtained the reaction they did with 2 to 3 oz. of pressure with the Cavitron was in itself surprising. Certainly, if 2 to 3 oz. of pressure could cause that much damage to monkey jaws it would not be unreasonable to expect that the amount of pressure used by Hansen and Nielsen,[68] less than 6 oz., would be sufficiently great to produce lesions in guinea pig incisors.

In Nielsen and Kennedy's study,[76] the average exposure time to ultrasonic cutting for the maxillary incisors was 170 seconds, and for the mandibular incisors, 220 seconds. Cutting was accomplished with a straight tip designed for that purpose. The tip was applied in an apical direction to the labial surface of the tooth, at the incisal edge, with its long axis at an angle of about 45 degrees to a tangent at the point of application.

These ultrasonic exposure times were extremely long compared to those in the studies of Hansen and Nielsen[68] (5 to 10 seconds) and severe damage might be expected due to this factor alone. However, in this experiment the trauma was applied considerably distant from the tooth forming region. Twenty-five per cent of the teeth were seriously retarded in their postoperative eruption and approximately 63 per cent exhibited tissue reactions ranging from the reversible to the irreversible. Only 12 per cent of the teeth could be considered more or less normal.

When Kennedy and co-workers[77] repeated the earlier experiment of Nielsen and Kennedy with the same procedure, except for varying the cutting tip and the angle of application, and the same commercial instrument on 116 teeth (Groups B, C, and D) with average exposure times 50 to 70 seconds shorter than in the previous experiment, no severe irreversible changes were noted. Only in the group of 60 teeth prepared with an instrument vibrating at 40,000 cycles per second were these similarly severe irreversible changes found. Incidentally, the average cutting times were somewhat shorter in the latter group than that in Groups B, C, and D.

Kennedy and co-workers felt these inconsistent results might be explained by the curvature of the cutting tip or in the angle at which the tip was applied to the tooth. However, support for this hypothesis was not realized. Their results emphasized the effect of unknown variables with ultrasonic instruments. The vibrating characteristics of originally identical cutting tips change with wear of the cutting edge, which occurs as soon as the cutting begins. In addition, the pressure used, the duration of the operation, and thus the total dosage of ultrasound, vary with the technics and proficiency of the operator.

The enigma of the severe changes in the guinea pig incisor remains unexplained. One procedure which might be carried out to help resolve this dilemma would be to repeat these experiments and make histopathological examinations at intervals earlier than two weeks. Earlier examinations might at least permit an assessment for the characteristic features of burns. After two weeks sufficient time has elapsed for reparative phenomena to camouflage or replace any prominent burn characteristics.

Knapp[47] did not attempt to associate a relationship of ultrasonic exposure with ectasia of vascular channels or cyst formations. Two of the three cysts were found in the group receiving only ⅛ the maximum exposure time. Maximum exposure ran from 4 to 8 minutes, the ⅛ group ran from 30 to 60 seconds. Although the vascular ectasia and dilated lymph channels were noted in 4 of 5 groups, it did not seem to change per-

ceptibly as the amount of ultrasonic exposure decreased. He did state that vacuoles and cystic cavities appeared to result from pulpal edema.

SUMMARY AND CONCLUSIONS

A sufficient number of histopathological studies have been completed throughout the world to provide some confirmed information about the response of the dental pulp to the newer cutting technics.

Generally it has been found that high-speed operative technics are biologically acceptable to the dental pulp when the frictional heat of grinding is neutralized with the adequate use of an air-water coolant. No doubt, at any speed the elimination of frictional heat is desirable. Air alone as a coolant was not found to be consistently protective. Without coolants the diamond instruments were found to be the most destructive cutting tools. Intermittent grinding in the absence of coolants did not diminish the destructive capacity of diamond stones sufficiently to make it worthy of practice. However, certain carbide burs with intermittent grinding procedures in the absence of coolants were found to be not as destructive to the pulp.

It has been shown that even when frictional heat was neutralized, a greater pulpal response occurred with the lower speed technics because of the amount of applied pressure (force). As the amount of applied pressure was decreased with the increasing rotary speeds, the pulpal response was minimized.

Cavity depth, quite obviously, has become the all important dimension in determining the pulpal response with any operative technic. Extensive shallow cavity preparations involving an entire surface of teeth or full crown preparations produced pulpal responses of a mild nature, if any, with the high-speed technics, as compared to more remarkable responses resulting from deeper but more confined cavity preparations. Two millimeters of dentin thickness between the cavity floor and the pulp chamber provided an adequate insulating barrier against the more traumatic technics in spite of intentional abuse. But as the dentin thickness decreased from this value the pulpal response inversely increased.

In the future it is recommended that the standard filling material in all studies evaluating the pulpal responses to cutting technics be ZNOE. Experience has shown that subtle pulpal changes due to cutting procedures can be greatly magnified or camouflaged by the irritating properties of other filling materials.

Despite the advent of less traumatic, high-speed technics, all problems concerning pulpal irritation and death are not at an end. This circumstance has become more apparent as an increasing number of fully crowned teeth, prepared with high-speed instruments, require endodontic treatment.[81]

It must be remembered that with low-speed technics, sufficient irritation resulted from full crown preparation to cause the pulp to seal off freshly cut tubules with reparative dentin before the fabricated crown was cemented into place. With the high-speed technics a longer postoperative period is required before the pulp forms reparative dentin. Even then, the quantity of reparative dentin is generally less as compared to the amount formed following low-speed procedures. Consequently, finished crowns are often cemented into place before the freshly cut dentinal tubules are sealed naturally. More than ever, investigations are needed to develop improved and more certain methods of lining and coating unsealed dentinal tubules to offset the irritating properties of cements.

The lack of confirmatory evidence at this time minimizes the need for specifically delineating eosinophilic staining of the pulp with the term "rebound response." However, more studies are recommended so that eosinophilic staining may become better understood.

In the higher species, the ultrasonic cutting technics when properly used were not found to be unusually traumatic to the pulp. However, additional animal experiments are indicated to find an explanation for the severe destruction of the tooth-forming elements of the guinea pig incisor after less than ten seconds of exposure to ultrasonic vibration.

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Estimate of Population Increase • Projection of the post-World War II rate of increase gives a population of one person per square foot of the land surface of the earth in less than 800 years. It gives a population of 50 billions (the highest estimate of the population-carrying capacity of the globe ever calculated by a responsible scholar) in less than 200 years! This estimate, by geochemist Harrison Brown, is based on the assumptions that developments in the capturing of solar or nuclear energy will produce energy at a cost so low that it would be feasible to obtain all the "things" we need from rock, sea, and air, and that mankind would be content to subsist largely on food products from "algae farms and yeast factories!" *Philip M. Hauser. Demographic Dimensions of World Politics. Science 131:1642 June 3, 1960.*

Differential diagnosis: fixed or removable partial dentures

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The choice between fixed and removable partial dentures for a given situation should be governed by the following criteria:

1. By which method of treatment will the patient be best served?

2. Is the prosthetic service recommended the best that dentistry has to offer? If compromises are necessary, are the alternative methods of treatment acceptable by today's standards?

3. Is the dentist willing to assume the professional responsibility for the accomplishment of the treatment being recommended?

The first requirement in making a diagnosis and deciding on a logical course of treatment for the partially edentulous mouth is that the dentist must have an open mind regarding the relative merits of fixed and removable restorations. There are indications for the use of each type of restoration, and the dentist must be able to differentiate between the merits of one or the other for a given situation.

It must be assumed that diagnosis of the partially edentulous mouth is accomplished with objectivity and without prejudice, utilizing all the diagnostic aids available to modern dentistry. It also must be assumed that total treatment or total oral rehabilitation is the ultimate objective rather than, as is too often the case, only the replacement of a few missing teeth. Errors in diagnosis and treatment occur more often as a result of too limited a consideration of the long-term needs of the patient than for any other reason.

The diagnostic procedures required to plan prosthodontic treatment are as follows: (1) a thorough and complete cleaning of the teeth including the elimination of calcareous deposits to permit better visualization and to facilitate the making of accurate impressions of actual tooth surfaces; (2) visual and digital examination of the entire oral cavity; (3) determination of tooth vitality; (4) interpretation of adequate roentgenograms, and (5) visual and topographic survey of accurate study casts, preferably oriented on a suitable diagnostic instrument.

There is some confusion in the use of the terms "fixed partial denture" and "removable partial denture." A "fixed partial denture" or a "fixed bridge" is one which is cemented to abutment teeth and is not removable by the patient. A "removable partial denture" may be either totally tooth supported or supported in part by the tissue of the residual ridge. If it is supported entirely by abut-

ment teeth, it may logically be called a "removable bridge" even though it may be bilateral in design.

According to the terminology which I believe is the most logical, a true partial denture differs from a removable bridge prosthesis in that it has one or more free-end bases and derives its support from both the teeth and the edentulous residual ridge. It should therefore be understood that I am talking about the fixed bridge (or fixed partial denture) on the one hand and both the removable bridge and the true partial denture on the other.

At the risk of oversimplification, I believe a rule may be stated to the effect that the replacement of missing teeth by means of fixed restorations always should be the method of preference, and the decision to use a removable restoration instead should be based on just and logical reasons for doing so. Unless a fixed bridge restoration is contraindicated for some reason, one cannot justify the use of a removable restoration for arbitrary reasons alone.

Consideration first will be given to indications for the use of fixed restorations, followed by the indications for the use of removable restorations, and the justification for each.

INDICATIONS FOR USE OF FIXED RESTORATIONS

Tooth-bounded Edentulous Regions • Generally, any unilateral edentulous space with teeth remaining at each end which can be used as abutments should be restored with a fixed bridge cemented to one or more abutment teeth at each end. The length of the span and the periodontal support of the abutment teeth will determine the number of abutments required.

Lack of parallelism of the abutment teeth need not necessarily rule out the making of a fixed bridge, because copings or locking recesses may be utilized to provide parallel sectional insertion when this is necessary. Neither should the presence of sound abutment teeth influence the decision to use a removable restoration where a fixed bridge restoration is otherwise indicated; instead, this should be looked on as an opportunity to use more conservative retainers such as inlays rather than full crowns, especially where not more than two teeth are being replaced. The age of the patient, evidence of caries activity, oral hygiene habits and the soundness of remaining tooth structure must all be considered in any decision to use less than full coverage for any abutment tooth.

Only rarely should economics be allowed to dictate the use of a unilateral removable bridge where a fixed bridge is indicated. In most instances the patient will be better served by using properly prepared abutment restorations which will provide better support and retention for the prosthesis and also better protection for the abutment teeth. The total cost of the removable bridge will thus be comparable to that of a fixed bridge when the cost of the abutment restorations is added, and little is gained economically by the use of a removable prosthesis.

One frequently hears the arguments in favor of removable unilateral bridges that the patient will not allow a sound tooth to be cut for the sake of placing abutment restorations or that the patient's health will not allow such procedures. In answer to the former, the dentist must be allowed to follow the best procedure for the welfare of his patient just as the medical surgeon prescribes the best method of treatment for his. The patient is always free to seek more than one opinion if he so desires, but if there is a conflict in the method of treatment recommended by more than one dentist, the responsibility for the choice of dental treatment becomes the patient's. In answer to the latter, it is doubtful that the patient who, for reasons of health, cannot undergo reasonable operative procedures should be encumbered with an appliance that will

be less than adequate. When a removable unilateral restoration is made for such a patient, it should be considered primarily as a space maintainer and an interim appliance until more definitive treatment is possible. In the meantime, the patient should be cautioned against continuous wear of the appliance unless meticulous oral hygiene is maintained.

There are two specific contraindications for the use of unilateral fixed restorations. One is where the edentulous span is very long and the abutment teeth would not be able to withstand the trauma of horizontal and diagonal occlusal forces. The other is where abutment teeth weakened by periodontal disease would benefit from the bracing effect of cross-arch stabilization. In either situation, and frequently the two exist together, a bilateral removable restoration can be used to replace the missing teeth more effectively than unilateral fixed restorations. As with any removable restoration, properly contoured abutment retainers, either inlays or full crowns, will better insure the success of the removable partial denture.

Modification Spaces • In the Kennedy method of classification of partially edentulous arches, any edentulous space not contributing to the initial classification is spoken of as a modification of that class. A removable partial denture for a Class III arch is better supported and stabilized when a modification area on the opposite side of the arch is present. Such an edentulous area would not be restored by a fixed bridge since it is essential to the design of the removable partial denture. Additional modification spaces, however, particularly those involving single missing teeth, are better restored separately by means of fixed bridges. Not only is a lone-standing abutment thus stabilized by the splinting effect of a fixed bridge, but a possible teeter-totter effect on the partial denture is avoided. Moreover, the partial denture is made less complicated by not having to include other abutment teeth for the support and retention of an additional edentulous space or spaces.

Frequently an edentulous space which is a modification of either a Class I or Class II arch exists anterior to a lone-standing abutment tooth. This tooth would be subjected to trauma by the movements of a free-end partial denture far in excess of its ability to withstand such stresses. The components of such stresses are mesiodistal, horizontal and rotational. This makes the splinting of the lone abutment to the nearest tooth mandatory. Splinting is best accomplished in such a situation by means of a fixed bridge uniting the two teeth on either side of the edentulous space. This is almost always a specific indication for a fixed bridge. The abutment crown should be contoured so as to provide support and retention for the partial denture, and, in addition, means of supporting a stabilizing component on the anterior abutment of the fixed bridge or on the occlusal surface of the bridge pontic usually should be provided.

Anterior Modification Spaces • I believe the statement can be justified that any missing anterior teeth in a partially edentulous arch, except in a Kennedy Class IV arch where only anterior teeth are missing, are best replaced by means of a fixed bridge. There are exceptions, of course. Sometimes a better esthetic result is obtainable when the anterior replacements are supported by the partial denture, especially where abutment restorations on the adjacent natural teeth are not otherwise necessary. This is also true where excessive resorption would necessitate the placement of bridge pontics too far posteriorly for good esthetics and an acceptable relation with the opposing teeth. Also, economics may dictate the replacement of anterior teeth with the partial denture rather than by means of an anterior fixed bridge. But from both a mechanical and a biological standpoint,

anterior replacements are best accomplished with fixed restorations.

When anterior teeth are replaced with a removable partial denture, support for the anterior segment is difficult to obtain unless multiple rests on several adjacent teeth are used. Incisal rests cannot be used because of the leverage induced, not to mention their objectionable display of metal. Therefore, multiple crown ledges and occlusal rests must be used to support the anterior segment. It is often better to avoid the numerous components necessary to support an anterior segment of the partial denture by resorting to the use of an anterior fixed bridge instead. The replacement of the missing posterior teeth with a partial denture is then made much less complicated and with more satisfactory results.

These considerations are even more applicable where the partial denture will have one or two posterior free ends. I would prefer always to replace missing anterior teeth separately by means of a fixed bridge even where the posterior restoration was totally supported and retained by abutment teeth. But with one or more free-end bases, some anterior-posterior rotation, or teetering, will inevitably result, to the detriment of both the abutment teeth and the residual ridge. The distal end of a tooth-borne partial denture is prevented from moving tissueward by the occlusal rests on the posterior abutment; it is prevented from rotating away from the tissues by the direct retainer on the same abutment. In contrast, a free-end partial denture base is free to move in either direction. Tissueward movement is limited by the quality of tissue support and the accuracy of fit of the denture base. Movement away from the tissues is limited to some extent by the presence of indirect retainers, and by the inherent retention of the denture base. But some teetering action is inevitable when a free-end partial denture is used to support missing anterior teeth. This can best be avoided by replacing the missing anterior teeth separately with a fixed bridge or by supporting the anterior denture base with a fixed bar soldered to adjacent abutment castings.

Nonreplacement of Missing Molars • Frequently the decision must be made whether or not to replace missing molars on one side of the arch only. To do so with a removable partial denture necessitates the making of a free-end partial denture with the major connector joining that side to retentive and stabilizing components located on the opposite, nonedentulous, side of the arch. Leverage factors are always unfavorable in such a situation, and the retainers which must be used on the nonedentulous side are frequently unsatisfactory. Several factors, therefore, will influence the decision to make a unilateral free-end partial denture.

First, the opposing teeth must be considered. If they are to be prevented from extrusion and migration, some opposing occlusion must be provided. This would influence the replacement of the missing molars far more than any improvement in masticating efficiency which might result. I can think of no instance where the replacement of missing molars on one side is necessary for reasons of mastication alone.

Second, the future of a maxillary tuberosity must be considered. Left uncovered, the edentulous tuberosity frequently will seem to drop and increase in size. Whether this is due to unilateral posterior closure with intrusion of adjacent remaining teeth or to a migration of the maxillary tuberosity is not known. However, covering the tuberosity with a partial denture base, in combination with the stimulating effect of the intermittent occlusion provided, helps to maintain the normalcy of the tuberosity. This may be of considerable importance in any future denture replacements the patient may require. In such an instance, it may be better to make a unilateral partial denture

than to leave a maxillary tuberosity uncovered.

A third consideration is the condition of the opposing second molar, if present. If this tooth is missing or can logically be ignored or eliminated, then only first molar occlusion need be supplied. This is perhaps accomplished best by "throwing off" a molar pontic from two bicuspid abutments, in other words, by utilizing a cantilever fixed bridge. Occlusion need be only minimal to maintain occlusal relations between the natural first molar in the one arch and the prosthetic molar in the opposite arch. Such a pontic should be made narrow buccolingually and need not be made to occlude with more than two thirds of the opposing tooth. Frequently such a fixed bridge is the preferred method of treatment, thus avoiding the necessity of making a unilateral removable partial denture.

INDICATIONS FOR REMOVABLE PARTIAL DENTURES

Generally, a removable partial denture should be considered only when a fixed bridge is contraindicated for one reason or another. However, there are a number of specific indications for the use of a removable restoration.

Free-end Situations • Except where the replacement of missing second (and third) molars is either not advisable or unnecessary, or where unilateral replacement of a missing first molar can be accomplished by means of a cantilever fixed bridge, replacement of missing posterior teeth without the assistance of a posterior abutment must be accomplished with a removable partial denture. The most common partially edentulous situations are the Kennedy Class I (bilateral free-end) and Class II (unilateral free-end). With the latter, an edentulous space on the opposite side of the arch is often conveniently present to aid in the effective retention and stabilization of the partial denture. If not, embrasure clasps or intracoronal retainers usually must be used. In some instances, a questionable tooth, preferably the first molar, can be extracted to provide an edentulous space. All other edentulous areas, especially those involving missing anterior teeth or a missing tooth anterior to a lone-standing abutment, are best replaced with fixed bridges.

After Recent Extractions • The replacement of teeth after recent extractions cannot be accomplished satisfactorily with a fixed restoration. Where rebasing will be required later or where a fixed bridge will be constructed later, a removable partial denture must be used. In any situation in which ultimate replacement can be accomplished better with a fixed restoration, the partial denture should be considered only as a temporary or interim appliance. In such instances, an all-resin denture is used rather than a more elaborate partial denture, and the cost to the patient for the temporary appliance is therefore much less.

A tooth-bounded edentulous area that otherwise could be restored with a fixed bridge, but because of recent extractions some change in the residual ridge is anticipated, is also best restored with a removable partial denture. Although the relining of a tooth-supported resin denture base thus is made possible, this is usually done only to improve esthetics, oral cleanliness, or patient comfort, and rarely, if ever, to provide support to the denture. Support for such a restoration should come from the occlusal rests on the abutment teeth lying at each end of the edentulous space.

Long Span • A long span may be totally tooth-supported if the abutments and the means of transferring the support to the denture are adequate and the denture framework is rigid. There is little, if any, difference between the support afforded a removable partial denture and that af-

forded a fixed bridge by the adjacent abutment teeth. However, the fixed bridge does not have the advantage of bilateral stabilization that the removable partial denture may have, and, therefore, more than a single abutment at each end should be used whenever possible to compensate for the lack of bilateral stabilization.

An example where a fixed bridge may be contraindicated is an edentulous span from cuspid to lone second or third molar. Obviously, the strength of double abutments is not obtainable posteriorly, and the inclusion of the lateral incisor as an additional abutment is impractical and of little value. Therefore, a fixed bridge would have to comprise three or four pontics supported by a single abutment at each end. In the absence of cross-arch stabilization, the torque and leverage on the two abutment teeth would be excessive. Instead, a removable partial denture deriving retention, support and stabilization from abutment teeth on the opposite side of the arch is indicated as the logical means of replacing the missing teeth. As always, this is better accomplished when an edentulous space, preferably at the second bicuspid or first molar, exists on the opposite side of the arch.

Need for Effect of Bilateral Bracing • In a mouth weakened by periodontal disease a partial denture may do more for the abutment teeth than the abutment teeth can do for the partial denture. Because of the lack of cross-arch stabilization, a fixed bridge may jeopardize the future of abutment teeth involved in periodontal disease unless the splinting effect of multiple abutments is employed. Indeed, those prosthodontists and periodontists who strongly favor fixed splinting in all instances usually insist on encircling the arch with united restorations rather than relying on unilateral splinting alone. The partial denture, on the other hand, may act as a periodontal splint through its effective cross-arch bracing of teeth weakened by periodontal disease. However, this is true only when vertical tooth surfaces are available or created which may act as positive guiding planes, when occlusal rests in definite prepared areas are used, and when the abutment teeth are so contoured that uniform retention and rigid bracing components are made possible. It is unlikely that a partial denture made for a mouth that has not been subjected to careful survey and meticulous mouth preparation will provide the degree of stabilization to the arch that is possible by a carefully executed design. But when a number of abutment teeth throughout the arch are properly prepared, and more often than not this necessitates the use of carefully contoured abutment retainers, the beneficial effect of a partial denture may be far greater than the effect of a unilateral fixed bridge.

Esthetics in Anterior Region • Where the replacement of missing anterior teeth in a partially edentulous arch is the primary consideration, esthetic and cosmetic demands sometimes are better served by the use of denture teeth rather than bridge pontics. This is particularly true where a number of anterior teeth are missing, such as in a Kennedy Class IV arch, or where a better tooth arrangement and better contours and shading are possible through the use of denture teeth.

There is no need to go into the types of anterior bridge pontics one might use, and the limitations and disadvantages of each. However, where an anterior fixed bridge involving more than two missing teeth is constructed, I prefer one method over all others which provides an opportunity to use denture teeth as one would with a partial denture. In this method, resin denture teeth are selected for shade, size and contour and set on the master cast in an acceptable arrangement. A plaster index then is made of the labial surfaces of these teeth in relation to the cast, and the teeth are attached to a wax

trial base. They then are tried in the mouth and any alterations made for esthetic or functional reasons.

The teeth then are returned to the cast, hollowed out lingually, and a cast bar which will also form the cingulum of each tooth is constructed with retentive loops projecting labially. After soldering to the abutment castings, the bridge is finally assembled by attaching the teeth with resin of the same shade. Such a bridge comes as close as possible to equaling the esthetic result of a partial denture with all of the advantages of a fixed bridge.

Excessive Loss of Residual Bone • The pontic of a fixed bridge must be related to the residual ridge in such a manner that the contact with the mucosa is gentle. Where excessive resorption has occurred, however, teeth supported by a denture base may be set in a more acceptable buccolingual position than is possible with a fixed bridge.

Posteriorly, loss of residual bone occurs for the most part from the buccal aspect. Although two opposing bridges made concurrently or a bridge to which an opposing complete or partial denture will be made to occlude might be acceptable with pontics resting on the resorbed ridge, the opposing denture teeth cannot then be set as far buccally as the natural dentition. Tongue and cheek contact is therefore abnormal, and function is impaired. Food impaction and masticatory inefficiency result from the failure to restore natural contours. In contrast, artificial teeth supported by a denture base can be set without regard to the crest of the residual ridge and more nearly in the position of the natural dentition. This is particularly true of a maxillary denture. All too commonly the technician has learned to set teeth "on" the residual ridge, which locates them too far lingually. When supported by a denture base, the teeth may be set in a more acceptable buccolingual position than is possible with a fixed bridge where excessive bone resorption has occurred.

Anteriorly, loss of residual bone occurs from the labial aspect. Often, the incisive papilla lies at the crest of the residual ridge. Knowing that the location of the incisive papilla does not change, and knowing that the central incisors are normally located anterior to this landmark, any other location of artificial central incisors is unnatural. An anterior fixed bridge made for such a mouth will have pontics resting on the labial aspect of this resorbed ridge that are too far lingual to provide desirable lip support. Frequently the only way the incisal edges of the pontics can be made to occlude with the opposing lower anterior teeth is to use a labial inclination that is excessive and unnatural, and both esthetics and lip support suffer thereby. Although the same applies to a removable partial denture in which the anterior teeth are abutted on the residual ridge, there are times when a labial flange must be utilized to permit the teeth to be located more nearly in their natural position. With denture-base staining technics and a wide selection of denture-base shades to choose from, this can usually be done acceptably and with much better effect than with improperly located pontics.

The same applies to the replacement of missing lower anterior teeth. All dentists have seen lower anterior bridges six or more units in length where the remaining space necessitates either leaving out one anterior tooth or using the original number of teeth but with all of them too narrow for esthetics. In either instance, the bridge is nearly in a straight line as the pontics follow the form of the resorbed ridge. Again, a removable partial denture permits the location of the replaced teeth in a favorable relation to the lip and opposing dentition regardless of the shape of the residual ridge. When such a removable prosthesis is made, however, positive support must be obtained from the adjacent abutments either in

the form of definite rests or through the use of a fixed bar soldered to abutment retainers.

Unusually Sound Abutment Teeth • Too often the excuse has been offered for making a removable restoration where a fixed restoration is clearly indicated that the dentist or patient, or both, did not want to see sound teeth crowned or prepared for other types of abutment retainers. The reasons for the loss of the teeth being replaced must be considered first. If for reasons of neglect or caries, then it is likely that caries also will occur eventually in the abutment teeth and even more so because of the effect of the denture components on those teeth. If the teeth were lost because of periodontal disease, then the periodontium of the remaining teeth must be evaluated carefully and the possible advantages of splinting several abutment teeth considered. If the teeth were lost for other reasons, such as the neglect of minimal caries, and if the caries activity which preceded extraction has since become diminished or arrested, the utilization of existing tooth surfaces to support a removable restoration may be justified. If caries activity is not apparent, the oral hygiene habits of the patient are favorable, and the abutment teeth are sound with good periodontal support, unprotected abutments may be used to support and retain a removable restoration. However, such a combination of circumstances is very uncommon. When it does exist, the dentist should not hesitate to reshape and modify existing enamel surfaces to provide proximal guiding planes, occlusal rest areas, optimal retentive areas, and surfaces on which nonretentive stabilizing components may be placed. An enamel surface thus prepared and repolished is no more likely to become carious in the future than the original surface and, in many instances, less likely because of the effect of repolishing the new surface.

It is only in selected instances, then, that the making of a removable prosthetic restoration on unprotected abutments can be justified just because the abutment teeth are sound. Certainly other criteria should be used in making a decision to use unprotected abutments.

Economic Considerations • Just as the existence of sound abutments should not be the only factor deciding the choice of restorative treatment, neither should economics alone be allowed to dictate the method of treatment. Too frequently the dentist allows this to influence the type of restorative treatment recommended. A removable partial denture is then made on unprotected abutments with little or no attempts at mouth preparations, involving a minimum of chair-time and a maximum of assistance from the commercial laboratory. This practice cannot be condemned too strongly, for it is the prime factor in all impending "denturist" legislation. Prosthetic dentistry is being betrayed by those who, for selfish reasons, delegate professional responsibilities to the dental technician outside of their own office. Moreover, respect for the profession suffers in the long run, because too often all that the patient receives is a partial denture that is forever a foreign body in his mouth, with eventual loss of remaining teeth due to caries or periodontal disease. In most such instances, the patient would have been better served with no replacements at all. On the other hand, had the advantages of a complete service been explained to him, who can say that the means of financing such service could not have been found. A look at the financial status of the parents of children receiving orthodontic treatment is proof that the means will be found if the desire is great enough. Unfortunately, however, with some families this is the very reason why the parents cannot afford necessary prosthetic treatment.

When, for economic reasons or because the prognosis of the remaining teeth is poor, complete treatment is inadvisable

or out of the question, and yet replacement of missing teeth is indicated, the type of restoration dictated by these considerations must be described clearly to the patient as being of a temporary or interim nature and not representative of the best that modern dentistry has to offer. In some instances, such as after recent extractions, the restoration may be replaced at some future time with more complete treatment. Such a removable prosthesis can render satisfactory service for a period of time and yet the patient must clearly understand its purpose and limitations. Depending on many factors such as oral cleanliness and other caries and periodontal control measures, a removable partial denture of this kind may indeed have a very useful life. Ordinarily, however, a prosthesis which is made to satisfy economic considerations alone is doomed to failure, and both professional esteem and the patient suffer thereby.

SUMMARY

The choice between fixed and removable partial dentures for a given situation should be governed by the following criteria:

1. By which method of treatment will the patient be better served? A free-end situation usually necessitates the making of a removable partial denture. In all other situations, factors of esthetics, periodontal health, preservation of remaining teeth, mechanical and biological factors, and the patient's economic status must all be taken into consideration. Rarely, if ever, should a removable restoration be used where a fixed replacement is clearly indicated. Some of the few exceptions to this are after recent extractions, where the prognosis of the remaining teeth is poor, or where the patient's economic position does not permit optimal treatment.

2. Is the prosthetic service recommended the best that modern dentistry has to offer? If compromises are necessary for economic or other reasons, are the alternative methods of treatment still acceptable by today's standards of adequate prosthetic treatment?

3. Is the dentist willing to assume the professional responsibility for the accomplishment of the treatment being recommended?

When all three of these questions have been answered satisfactorily, prosthetic treatment of the patient may proceed with the knowledge that a logical and reasonable plan for treatment has been recommended.

1919 Seventh Avenue, South

Presented as part of a panel discussion "Problems associated with partial prosthodontics," American Dental Association, one-hundred and first annual session, October 18, Los Angeles.

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Life and Death • An individual human existence should be like a river—small at first, narrowly contained within its banks, and rushing passionately past boulders and over waterfalls. Gradually the river grows wider, the banks recede, the waters flow more quietly, and in the end, without any visible break, they become merged in the sea, and painlessly lose their individual being. The man who, in old age, can see his life in this way, will not suffer from the fear of death, since the things he cares for will continue. And if, with the decay of vitality, weariness increases, the thought of rest will not be unwelcome. I should wish to die while still at work, knowing that others will carry on what I can no longer do, and content in the thought that what was possible has been done. *Bertrand Russell, Portraits from Memory and Other Essays.*

Longitudinal cephalometric roentgenographic study of face and cranium in relation to body height

Jagdish K. Bambha, B.D.S., M.S., Denver

An analysis of eight skull measurements on serial lateral cephalometric roentgenograms of 25 boys and 25 girls reveals that the face shows the characteristic skeletal growth pattern, including distinct adolescent changes. The time of maximum growth spurt in the face usually occurs a little after the spurt in body height. The face continues to show a small increment of growth after the growth in body height has been completed. The girls had smaller absolute measurements with a slower rate of growth, and tended to mature about two to three years earlier than boys. This study may be useful to the orthodontist.

Quetelet[1] was the first person to give a detailed quantitative analysis of human growth. He failed to recognize the adolescent growth spurt, but his tables on the average stature show the presence of an adolescent growth spurt. Scammon[2] demonstrated the remarkable uniformity of growth of various organs during the prenatal period and great diversity of growth of the same organs in the postnatal period. He showed that the general body growth curve has a well-marked adolescent growth spurt, whereas the brain does not show this change.

Among other workers, Baldwin,[3] Meredith,[4] Shuttleworth,[5] Boyd,[6] Deming[7] and Maresh[8] have demonstrated the ever-present phenomenon of adolescent growth spurt in the various body segments.

Hellman[9-11] was one of the first to recognize the role of growth and development in bringing about the change in proportion of the face because of the different rates of growth in different parts. It was not until the introduction of cephalometric roentgenography[12, 13] that the real advancement in the cranial and facial growth study began. The most notable work done with regard to the growth and development of the face is that of Broadbent,[14] Brodie[15, 16] and Björk.[17]

There are few instances in the literature in which the growth of the skull has been related to the general body growth. Rose[18] found that the growth of the stature and body height showed distinct concomitance with the facial growth. The relative rates of growth showed that all the facial areas were undergoing a reduction in percentage increase with age.

Nanda,[19] while studying the individual pattern of growth of the face at the Child

Research Council, clearly demonstrated the adolescent growth spurt generally occurring a little after the similar growth spurt in body height.

PERCENTAGE INCREMENT

To demonstrate the change in the form of various facial and cranial dimensions due to the differing rates of growth, the method of three-point smoothing twice is used. Boyd demonstrated that this technic applied on absolute increments stabilizes the excessive fluctuations, which she considered to be due to a measuring error.[20] For a detailed description of this the reader is referred to Croxton and Cowden,[21] and Boyd.[6]

PRESENT STUDY

The present data for the longitudinal study of the growth of face and cranium were obtained from serial cephalometric roentgenograms accumulated in the study of physical growth which is part of the program of research of the Child Research Council, Denver. The program and the nature of the records have been discussed by Waldo[22] and Washburn.[23]

The data for this report consist of eight measurements from lateral cephalometric roentgenograms, taken each year, of 25 boys and an equal number of girls. The earliest record available on an individual in this study is at the age of 1 month and the latest at the age of 30 years. All the subjects in the study were born in Denver of the upper middle class socioeconomic group of Northern European ethnic origin.

For each individual 12 to 19 lateral head films were available. Among the group ten girls and six boys had orthodontic treatment. However, no attempt was made to separate these individuals from the rest of the group because no demonstrable changes could be observed on the growth curves as a result of this treatment. No effort was made in the

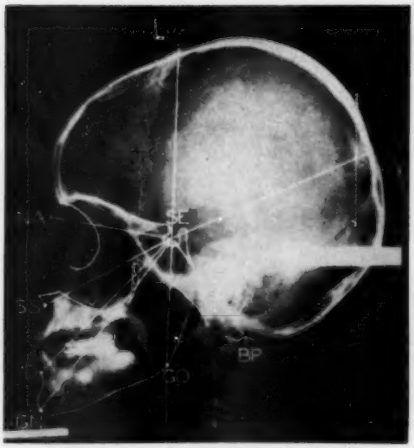


Fig. 1 • The three cranial dimensions, SE-BP (sella-Bolton Point), SE-La (sella-lambda), SE-Br (sella-bregma) and five facial dimensions, SE-NA (sella-nasion), SE-SS (sella-subspinale), SE-ID (sella-infradentale), SE-Gn (sella-gnathion) and SE-Go (sella-gonion) on lateral cephalometric roentgenograms considered in the present study

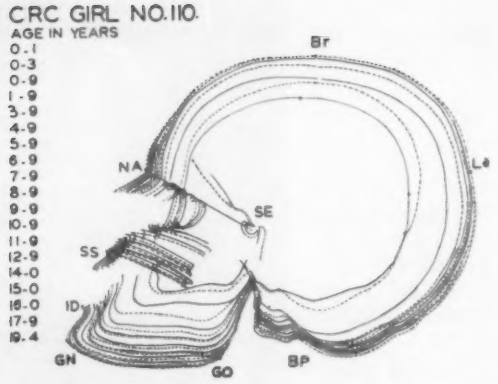
measurements to correct the magnification of the image, as the magnification was equal in all the roentgenograms.

MEASUREMENTS

Eight measurements were taken on each film, starting from the center of sella turcica and extending to the periphery of the bony outline. The following landmarks were used as terminal points: 1, Bolton Point (BP); 2, lambda (La); 3, bregma (Br); 4, nasion (NA); 5, subspinale (SS); 6, infradentale (ID); 7, gnathion (Gn), and 8, gonion (Go).

The definition used for bony landmarks is the same as described by Salzmann.[24] The measurements taken on each lateral roentgenogram are the three cranial, namely, sella-Bolton Point, sella-lambda and sella-bregma, and the five facial measurements, sella-nasion, sella-subspinale, sella-infradentale, sella-gnathion and sella-gonion (Fig. 1).

The measurements were taken directly



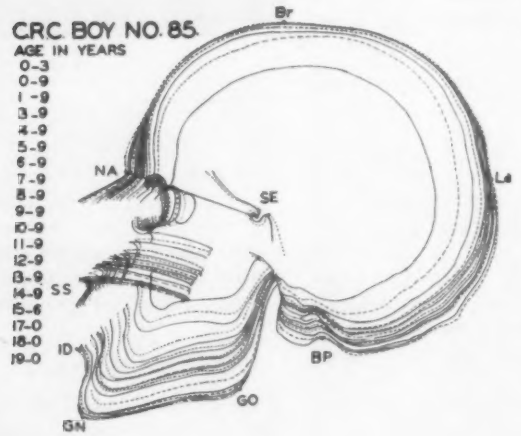
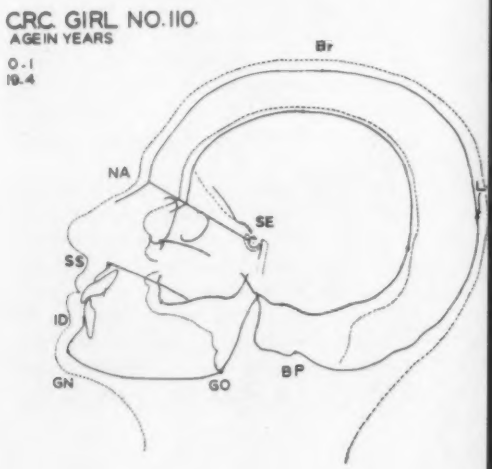


Fig. 2 • At left, lateral ceph
alometric tracings orientec
on sella-nasion line of one
boy and one girl

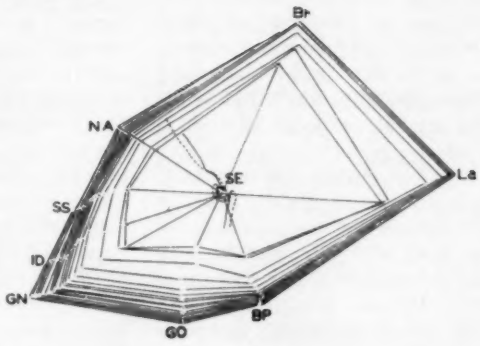
At right and below on facing page, first and last cephalometric tracings of bony and soft tissue outline



CRC GIRL NO. 110.

AGE IN YEARS

0-1
0-3
0-9
1-9
3-9
4-9
5-9
6-9
7-9
8-9
9-9
10-9
11-9
12-9
14-9
15-0
16-0
17-9
19-4

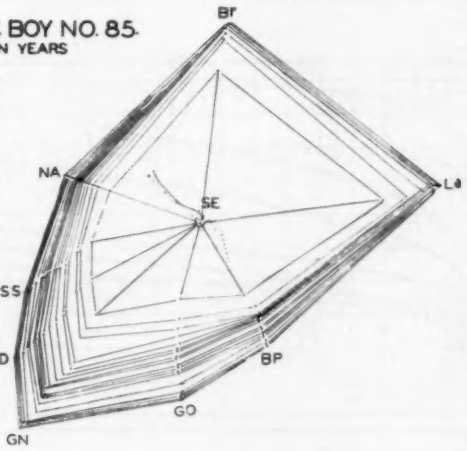


At right, diagrammatic representations of the tracings

CRC BOY NO. 85.

AGE IN YEARS

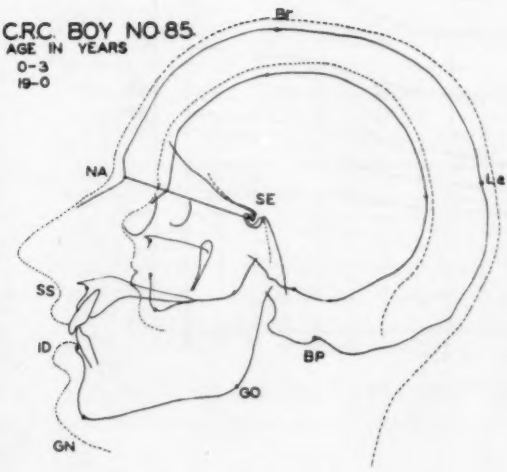
0-3
0-9
1-9
3-9
4-9
5-9
6-9
7-9
8-9
9-9
10-9
11-9
12-9
13-9
14-9
15-6
17-0
18-0
19-0



CRC. BOY NO 85.

AGE IN YEARS

0-3
19-0



on the film using a steel ruler with 20 graduations in each centimeter. The landmarks, located by inspection, were marked with a sharp point, and readings taken up to 0.1 mm. under magnifying glass. These measurements taken yearly are interpolated at six month intervals to plot the relative growth rate curves.

The working records on the body height measurements under the direction of Boyd[25] include the determination of the age of onset, maximum, and termination of the circumpuberal growth spurt as measured from the graphically determined smoothed six-month increment curves and their acceleration curves.

INDIVIDUAL PATTERN OF GROWTH

Figure 2 shows the lateral cephalometric roentgenographic tracings of a Child Research Council boy no. 85 from 3 months of age to 19 years of age. The cephalometric roentgenograms were oriented at the sella-nasion line centered at sella. The cranium showed a rapid rate of growth during infancy and early childhood, with about 90 per cent of its growth completed by the end of 3 years and 9 months while at the same time only 34 to 49 per cent of the growth had taken place in the facial dimensions by the end of that period. However, sella-lambda and sella-bregma

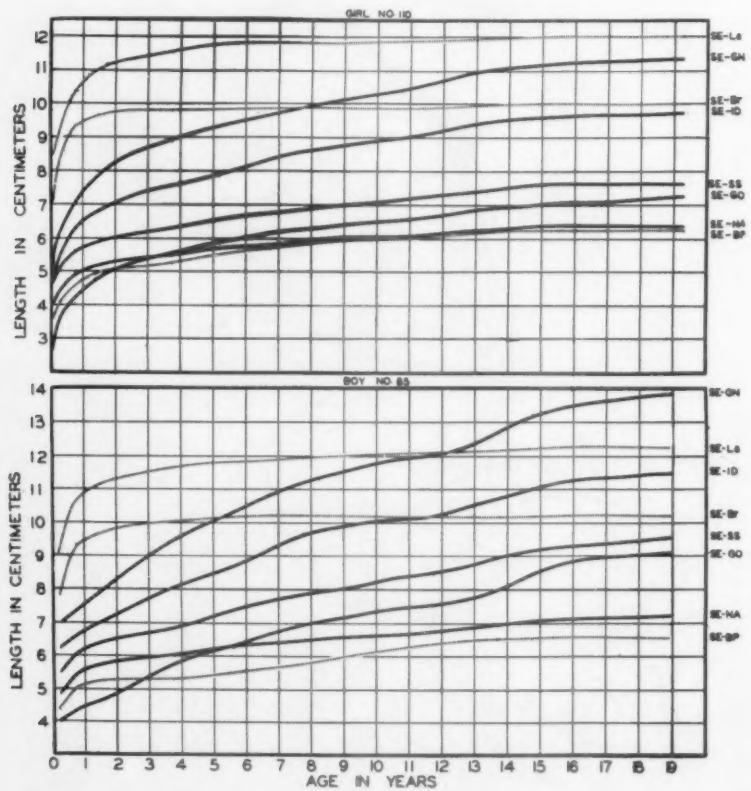


Fig. 3 • Growth curves of facial dimensions plotted in solid lines and cranial dimensions in stippled lines of boy no. 85 and girl no. 110

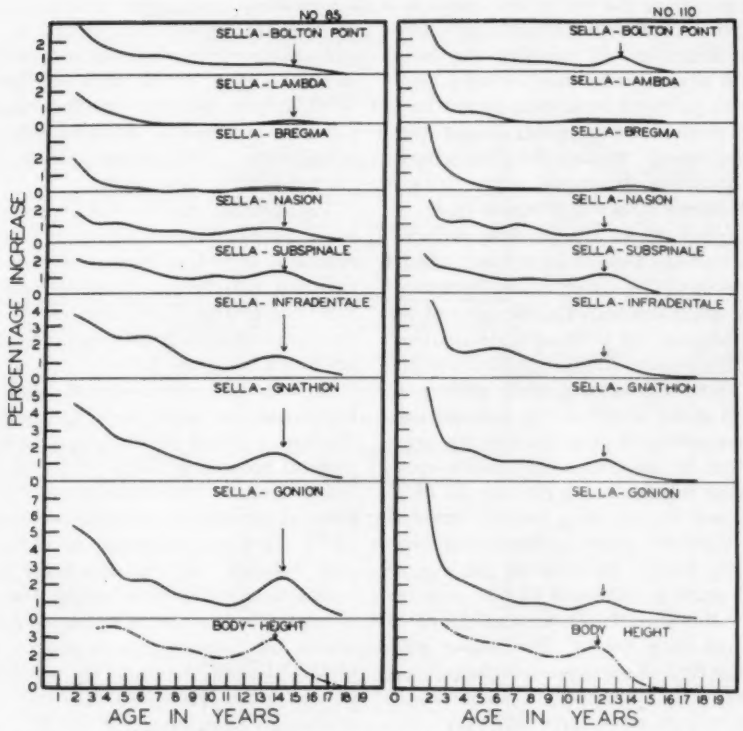


Fig. 4 • Percentage increment curves for facial and cranial dimensions and body height of boy no. 85 and girl no. 110

dimensions continued to show a very small increment of growth up to the age of 17 years. These two dimensions also showed a very slight adolescent growth spurt. This seems to be due to thickening of the bone during adolescence.

The sella-Bolton Point dimension shows a considerable increment with a well-marked adolescent growth spurt. The back of the skull shows thickening with a distinct increase in the size of external occipital protuberance during puberty. This supports the finding of Davenport[26] that the increase in head length is chiefly behind the external auditory meatus.

The convexity of the face is more pronounced during childhood, but is reduced considerably during adolescent growth period. This is due to a greater amount of growth in the lower facial region.

Figure 2 clearly shows the progression of growth when these points are joined together by means of straight lines, especially the circumpuberal growth period which can be traced all around the face. Figure 2 also shows the total amount of growth of bony structures and soft tissues outlined from 3 months to 19 years of age.

Figure 3 shows the absolute growth curves of the face and cranium. All the curves show a rapid rate of growth during preschool years, but from then on the cranial and facial growth curves show a different character. The cranial dimensions (dotted lines) complete most of

their growth by the end of four years, and then level off, showing a very small increment thereafter. In contrast the facial growth curves (solid lines) show a gradual rise, followed by a steep ascent for a short period during puberty and then slowing toward termination. The growth in sella-nasion dimension seems to be a composite of skeletal and neural type.

Figure 4 shows the percentage increment curves of eight facial and cranial dimensions. The curve at the bottom of the graph is the body height curve of the same boy, for the purpose of comparison. The five relative increment curves of the face show the same general pattern of growth as the height curve, with the rapidly decreasing slope in the first few years followed by an adolescent growth spurt reaching maximum at the age of 14.25 years and then slowing toward termination. This boy's circumpuberal maximum in body height occurred at the age of 13.70 years, a difference of 0.55 year between the circumpuberal maximums of face and body height. The arrows indicate the time of maximum circumpuberal growth. This circumpuberal maximum is preceded by a secondary childhood maximum between the ages of 6 and 7 years. This phenomenon of childhood maximums is consistent in most individuals in this study. The cranial dimensions also show a slight circumpuberal growth spurt.

Figure 2 also shows the lateral cephalometric tracings of a Child Research Council girl no. 110 from 1 month of age to 19 years and 4 months. The growth pattern of this girl can be described the same way as that of boy no. 85.

Figure 3 gives absolute growth curves of her face and cranium. Figure 4 gives the relative rates of growth of her facial and cranial dimensions and body height. It shows a rapidly decelerating growth curve until the third year of life, when the curves tend to level off. The five facial dimensions once again show a period of acceleration, which corresponds to the adolescent growth spurt reaching maximum at the age of 12.25 years. The time of maximum circumpuberal growth spurt in body height is 11.92 years, a difference of 0.32 year between the two circumpuberal maximums. Sella-lambda and sella-bregma dimensions show little change during adolescence.

To illustrate further the individuality of the phenomenon of growth in face and cranium, four boys and four girls who matured at different times were selected from the group. The curves of the relative rates of growth of these individuals are given in Figure 5.

Boy no. 108, whose lateral head tracings are shown in Figure 6, matured late. He had reached his maximum circumpuberal growth in body height at 15.15 years, whereas the maximum circumpuberal growth in his face occurred at 15.25 years—a difference of only 0.10 year between the circumpuberal maximums of face and body height. His relative growth rate curves in Figure 5 show slowly progressing growth over a long period before having an adolescent growth spurt. His sella-gonion rate curve reveals an interesting pattern of growth by having a well-marked postpuberal growth spurt. This postpuberal growth spurt has been observed in a few other individuals but to a slight extent and always including more than one dimension.

Boy no. 17 matured still later, having his circumpuberal maximum in height at the age of 15.70 years. The facial dimensions also showed a late circumpuberal maximum occurring at 16.05 years of age (Fig. 6). His lateral roentgenographic tracings showed considerable increase in the size of the frontal sinuses, occurring mainly after the circumpuberal growth spurt of the face. His relative rate curves (Fig. 5) showed the same long-drawn process, interrupted by a prepuberal growth spurt in facial dimensions similar to that described in connection with boy no. 108 before having an adolescent

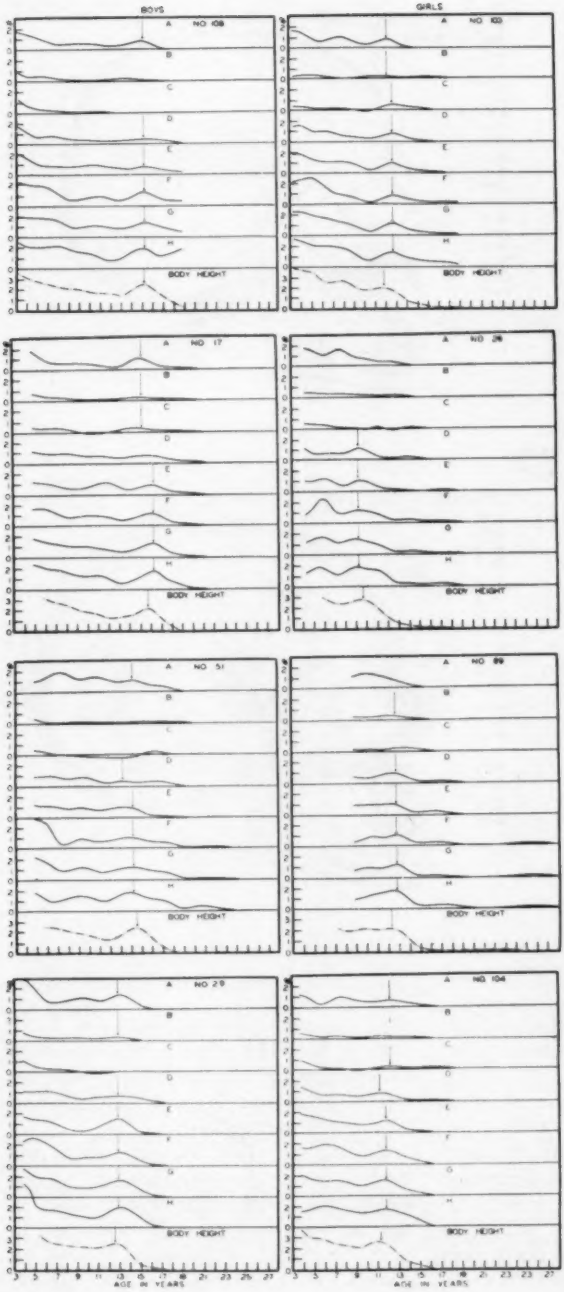


Fig. 5 • Percentage increment curves of facial and cranial dimensions and body height for four boys and four girls. Arrows indicate age of maximum circumpuberal growth in each dimension. A, sella-Bolton Point; B, sella-lambda; C, sella-bregma; D, sella-nasion; E, sella-subspinale; F, sella-infradentale; G, sella-gnathion, and H, sella-gonion

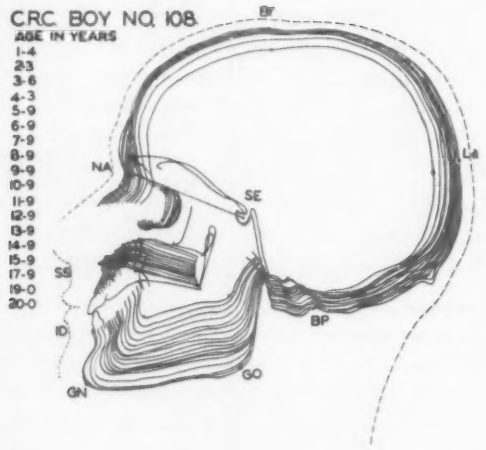
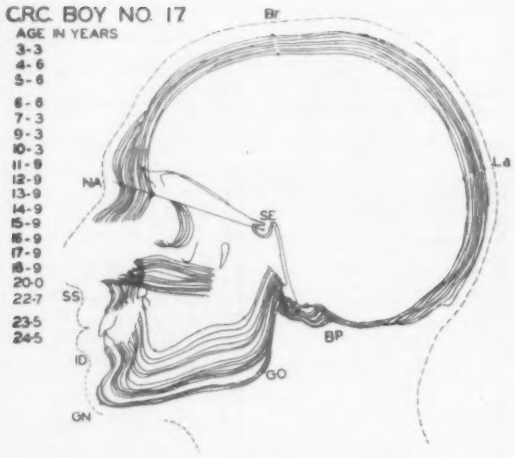
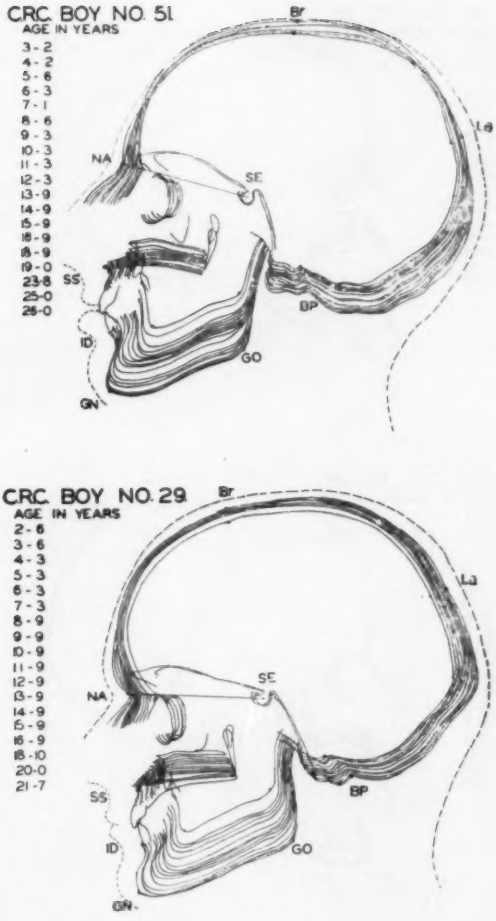


Fig. 6 • Cephalometric tracings of two boys superimposed on sella-nasion line



growth spurt, followed by a gradual slowing toward termination of growth between 18.9 and 20 years of age. A very small amount of growth occurred in the sella-nasion, sella-lambda and sella-bregma dimensions after the first few years. The sella-Bolton Point dimension showed considerable relative growth, especially during the adolescent period. In this instance the three cranial dimensions and the sella-nasion dimension showed their circumpuberal maximum at 15.25 years of age. The sella-bregma dimension showed an absolute decrease in size between the ages of 9 years 3 months and 12 years 9 months.

Boy no. 51 (Fig. 6) was about the median in age at maturation among our group. His circumpuberal maximum in the face occurred at 14.25 years and in body height at 14.55 years. In this instance the maximum in facial growth



Cephalometric tracings of two boys superimposed on sella-nasion line

occurred before the maximum in height. The relative growth rate curves of his face (Fig. 5) showed a different pattern of growth than the other three boys described. The curves tended to flatten out during the adolescent growth period instead of reaching a sharp peak and then gradually slowing toward termination with slight "postpuberal" growth spurt in the sella-gonion and sella-gnathion dimensions. His body height growth curve showed the same kind of growth pattern.

No particular adolescent growth spurt could be demonstrated in the sella-nasion dimension. His sella-bregma dimension showed a considerable decrease in absolute measurement between 9 years 3 months and 14 years 9 months. Once again sella-lambda had a very small total growth.

Boy no. 29 (Fig. 6) was the earliest maturing boy in this sample. His maximum circumpuberal growth spurt in body height occurred at 12.40 years and

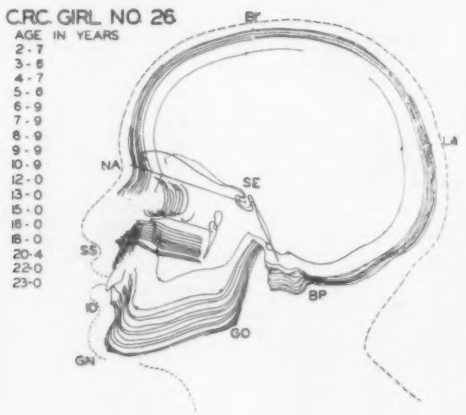
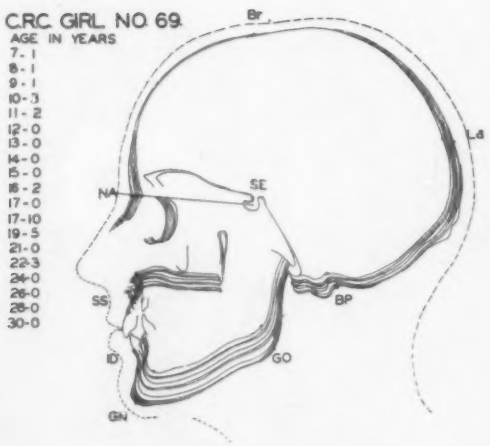


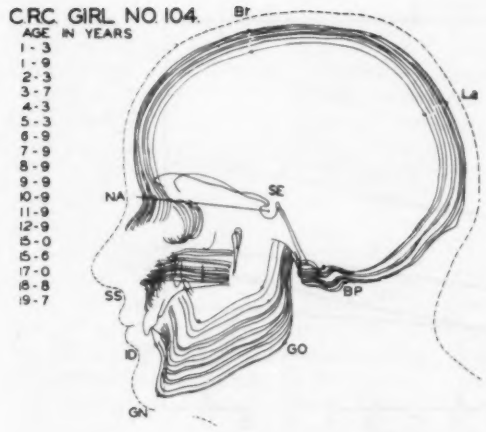
Fig. 7 • Cephalometric tracings of two girls superimposed on sella-nasion line

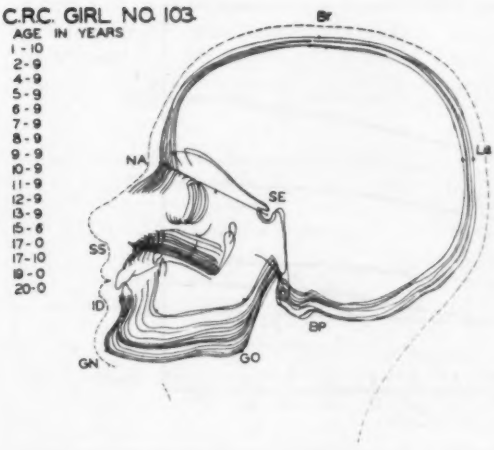


the corresponding maximum in facial dimensions occurred 0.35 year after that of the body height. His facial growth terminated at the age of 15 years and 9 months and growth in body height at 17.50 years; thus he was different from the other boys described in whom the face continued to show increments after the completion of growth in body height.

Inspection of his relative growth rate curves indicated a sharp rise during the adolescent period and an equally abrupt termination. All the facial and cranial growth curves, save the sella-bregma, had their circumpuberal maximums at the same period. Once again, the sella-bregma dimension had an absolute decrease.

Figure 5 shows the relative growth rate curves of the four girls selected from the group. Girl no. 26 (Fig. 7) matured earliest. Her maximum circumpuberal growth spurt in body height occurred at the age of 9.70 years and a similar maximum in the face at 9.25 years, or 0.45 year before the body height. Her relative





Cephalometric tracings of two girls superimposed on sella-nasion line

growth rate curves indicated a prominent prepuberal growth spurt and a slight postpuberal growth spurt with a gradual termination. Her growth curves were similar to those of boy no. 51. Both of them had flattened growth curves during adolescence with a postpuberal growth spurt and gradually terminating growth of the face. She did not show any adolescent changes in the sella-lambda and sella-bregma dimensions. The sella-bregma showed an absolute decrease in size between 9 and 11 years of age. Her cranial dimensions indicated completed growth at 13 years and the facial dimensions at 18 years of age. Growth in body height was also completed at 18 years.

Girl no. 69 (Fig. 7) reveals another pattern of facial growth. Her relative growth rate curves (Fig. 5) showed a considerable prepuberal growth before reaching the maximum point of the adolescent growth spurt at 12.75 years in all the facial and cranial dimensions, except the sella-Bolton Point. There was a gradual termination in growth followed by a

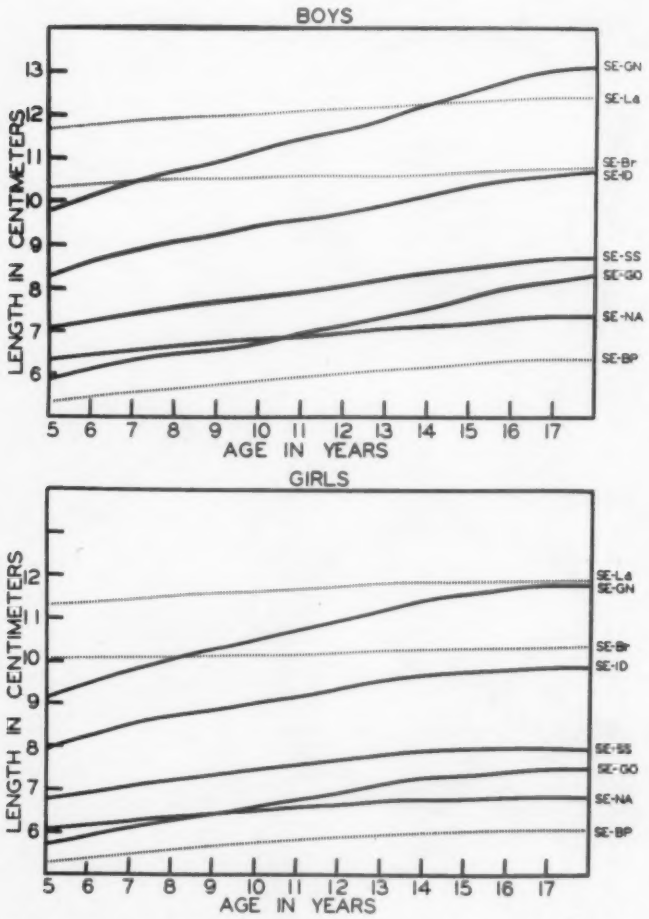


Fig. 8 • Averages of facial dimensions plotted in solid lines and of cranial dimensions plotted in stippled lines

postpuberal growth spurt in all the five facial dimensions. Another period of slight growth occurred between the ages of 22 years 3 months and 28 years in the sella-infradentale, sella-gnathion and sella-gonion dimensions. In no other individual of this series was this kind of growth phenomenon recorded. Increments in body height continued for a longer period than the rest of the group. The frequency of this finding cannot be determined at present, because most of the subjects in this study have not yet reached that age. Her growth in body height terminated at 24 years.

Girl no. 104 (Fig. 7) had greater facial measurements to begin with and had a considerable amount of facial growth, with a well-marked prepuberal growth spurt, before reaching adolescence. As a result she had a relatively large face as compared to other girls. She had her

maximum circumpuberal facial growth spurt at the age of 11.75 years. Her corresponding maximum in body height occurred at the age of 11.25 years. Relative rate curves in Figure 5 showed an abrupt and fairly early termination of growth in the facial dimensions and body height occurring at 15 and 15.60 years respectively.

Girl no. 103 (Fig. 7) had gradually decreasing relative growth rate curves (Fig. 5), reaching a point between 10 and 11 years when the relative rate of growth was very small before having the circumpuberal maximum. She has gradually terminating facial growth curves with a slight postpuberal growth spurt. Her circumpuberal maximums in facial growth and body height occurred at the age of 12.75 and 11.80 years respectively. She showed a slight circumpuberal maximum in the sella-bregma dimension occurring at the same time as that in the facial dimensions. The circumpuberal maximum in the sella-lambda dimension occurred at 12.25 years of age. She completed her body height growth at 16 years and her facial growth when she was 19 years of age.

GROUP PATTERN OF GROWTH

The observations made during the consideration of individual cases will be elaborated further in connection with the study of the group. Figure 8 shows the group curves of three cranial dimensions (broken lines) and five facial dimensions (solid lines) in the subjects of both sexes between 5 and 18 years of age. The age range was restricted to between 5 and 18 years because of lack of lateral cephalometric roentgenograms on an adequate number of individuals before and after

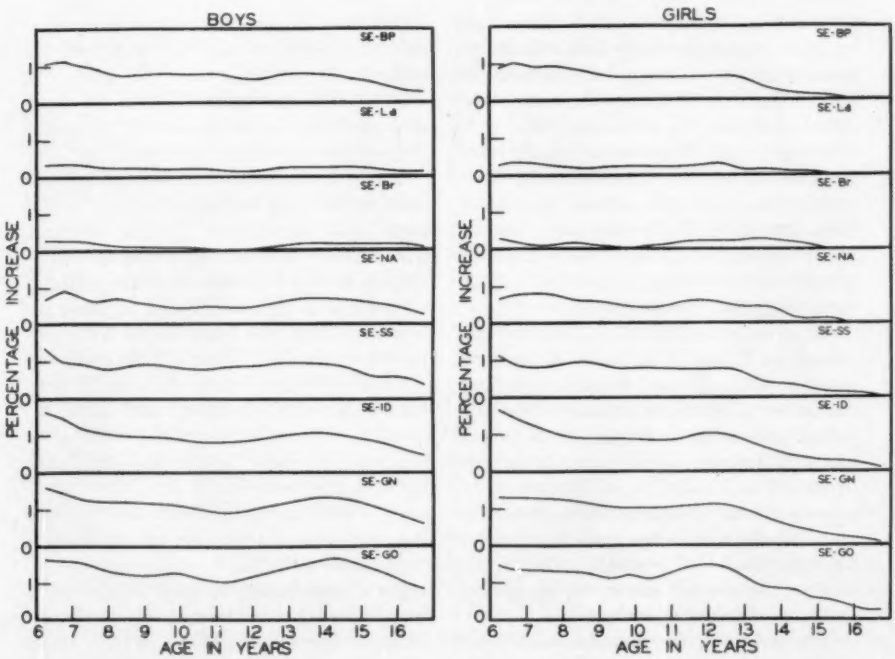


Fig. 9 • Percentage increment of the averages of facial and cranial dimensions for 21 boys and 17 girls

Table 1 • Average growth completion time in years of facial-cranial dimensions and body height

	Sella-Bolton Point	Sella-lambda	Sella-bregma	Sella-nasion	Sella-subspinale	Sella-infradentale	Sella-gnathion	Sella-gonion	Body height
Boys									
Minimum years	15.90	14.90	9.90	15.90	15.90	15.90	15.90	15.90	17.50
Mean years	16.10	17.40	17.10	18.20	19.10	21.20	21.60	21.40	19.69
Maximum years	21.00	21.00	21.00	23.00	25.00	26.30	26.30	26.30	23.00
Girls									
Minimum years	12.10	11.60	10.30	13.00	13.00	15.00	15.00	15.00	15.60
Mean years	14.60	14.20	14.20	15.60	16.10	18.20	19.70	18.10	18.77
Maximum years	17.00	17.00	17.00	19.00	19.00	22.30	28.00	21.00	24.00
Difference in two means	1.50	3.20	2.90	2.60	3.00	3.00	1.90	3.30	0.92

those ages. There were small increments in sella-bregma and sella-lambda dimensions over this entire period. Sella-nasion and sella-Bolton Point showed about equal increments, although they were relatively small. Sella-infradentale, sella-gnathion and sella-gonion showed considerable rise in growth curves, more so in boys than girls. Sella-subspinale had an intermediate amount of growth. The adolescent growth spurt in these four dimensions can be seen clearly.

Relative growth rate curves are also drawn in Figure 9 to show the growth pattern of the group. These curves can hardly be called representative of an individual both because of variations at any age and because of the greatly skewed distribution of the time of circumpuberal growth. These average growth curves are very different from the growth curves of an individual. By averaging, the sharpness in the rise of curves during adolescence is considerably reduced.

The difference in the mean increments of boys over girls in sella-nasion, sella-subspinale, sella-infradentale, sella-gnathion and sella-gonion is progressively greater. In 11 boys and 16 girls, the sella-lambda dimension showed an absolute decrease in measurement sometime between 6 years and 15 years of age.

Table 1 represents the average growth completion time for body height, cranial and facial dimensions. On the average, sella-infradentale, sella-gnathion and sella-gonion in boys and only the sella-gnathion dimension in girls continued to show increments after the body height has completed its growth. There is a difference of 1.50 to 3.30 years in the duration of continued increase in cranial and facial dimensions of boys as compared to the girls, whereas in body height the difference between the sexes is 0.92 year. The difference in sella-gnathion dimension between the two sexes is relatively small. In general, those individuals who continued to register increments in body height for a longer period than the rest also continued to show the similar change in their facial dimensions.

CHILDHOOD GROWTH SPURT

The childhood growth spurt was a constant feature, especially in the sella-nasion, sella-subspinale, sella-infradentale, sella-gnathion and sella-gonion dimensions in both sexes. These growth spurts were not as regular as the adolescent growth spurt. Also, no systematic comparable childhood secondary maximums are found on the rate curves for body height. Those for the facial dimensions occurred any time between 6 and 13 years of age. The average age for the childhood growth spurt in boys was 8.89 years and for the girls 7.73 years of age.

COMPARISON OF THE INDIVIDUAL WITH THE GROUP

In order to investigate the relative position of the individual's facial and cranial development in the group, percentiles were drawn for the group. Figure 10 shows the facial and cranial dimensions of two boys and two girls plotted on the percentile graph. Girl no. 67 and boy no. 42, whose facial measurements are on the relatively smaller side of the group, are represented by small dots, and girl no. 98 and boy no. 85, whose relative facial proportions are on the larger side, are represented by large dots.

The various dimensions show a tendency to maintain their relative position in the group throughout the growth period from 5 to 18 years. Dimensions sella-gnathion, sella-infradentale and sella-subspinale in the same individual tend to maintain their relative position together. That means that if one of these three dimensions is relatively bigger or smaller, the other two will be the same. In none of the other dimensions does a similar relation exist.

ADOLESCENT GROWTH PERIOD

Table 2 gives the age of the maximum circumpuberal growth spurt of various craniofacial dimensions and body height of the same individuals. In each individual the cranial and facial dimensions are separated. Combining the ages of the maximum adolescent spurt of cranial and facial dimensions is not justified, because the adolescent growth changes in the cranium are so small, inconsistent and often absent. The sella-Bolton Point curve shows some well-marked adolescent growth changes, but because of the extreme difficulty encountered in locating this landmark after about 12 years of age, the measurement is not considered very reliable.

The circumpuberal maximum in the five facial dimensions occurred at the same time in 17 boys (68 per cent) and 20 girls (80 per cent). In the rest of the individuals' facial dimensions, the circumpuberal maximums occurred within a year of each other. Three boys and five girls in the group registered the circumpuberal maximum in all the eight dimensions at the same time. In two boys no adolescent changes were recorded in sella-nasion, and one boy and two girls showed none in sella-subspinale dimension. In the cranial dimensions in 25 per cent of the girls and 21 per cent of the boys, no adolescent growth spurt was recorded.

Table 2 reveals that the facial and cranial measurements in individuals who were relatively late maturing in body height tended to show similar delayed maturation in the face and cranium, and early maturing individuals tended to mature early in facial and cranial measurements as well as in body height.

The mean time difference of maximum circumpuberal growth among boys' and girls' body height and facial and cranial dimensions is 2.31, 2.12 and 2.07 years, respectively. The time range in the earliest and latest circumpuberal maximum of body height and face is 3.85 to 4 years in boys and 3.55 to 4 years in girls.

Table 3 gives the time difference in subjects whose circumpuberal maximums in the five facial dimensions occurred be-

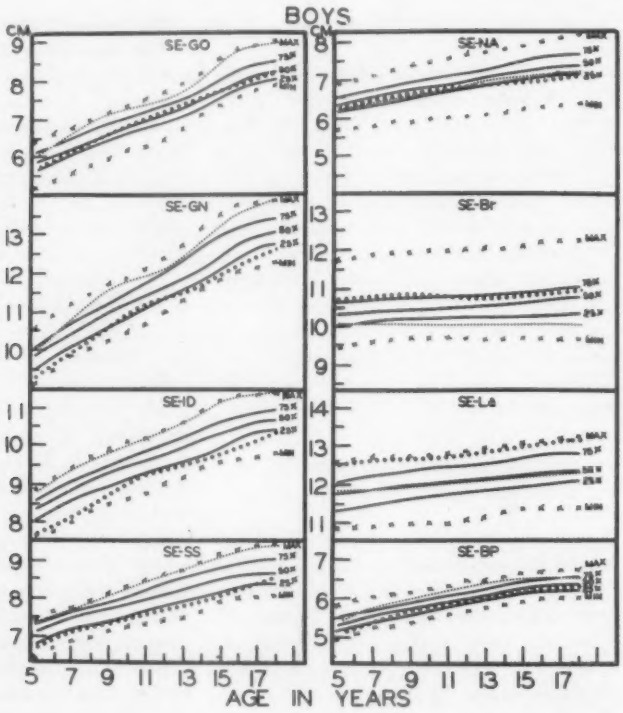


Fig. 10 (Boys) • Percentile graphs for facial and cranial dimensions with maximum and minimum. Facial and cranial dimensions of boys (no. 85 • • • • and 42 ....) plotted on percentile standards for each dimension

fore or after the maximum in body height. Only one boy and one girl in this group had the circumpuberal maximum occur synchronously in facial dimension and body height. Except for three boys and three girls, all the other individuals had their circumpuberal maximums in facial growth within a year of those of body height. The majority of individuals (66 per cent) tended to have their maximum facial growth spurt after the body height spurt rather than before it (34 per cent). Sixty-seven per cent of the individuals had their maximum facial growth spurt within six months of that of body height, and 80 per cent within nine months.

POSITIVE ACCELERATION OF GROWTH DURING ADOLESCENCE

Table 4 gives the duration of positive acceleration of circumpuberal growth in the five facial dimensions, and compares it to the similar period in body height of 22 boys and 23 girls.

This is the time period from the age at which differential puberal effects on growth become visible to the point when maximum growth rate is reached. This

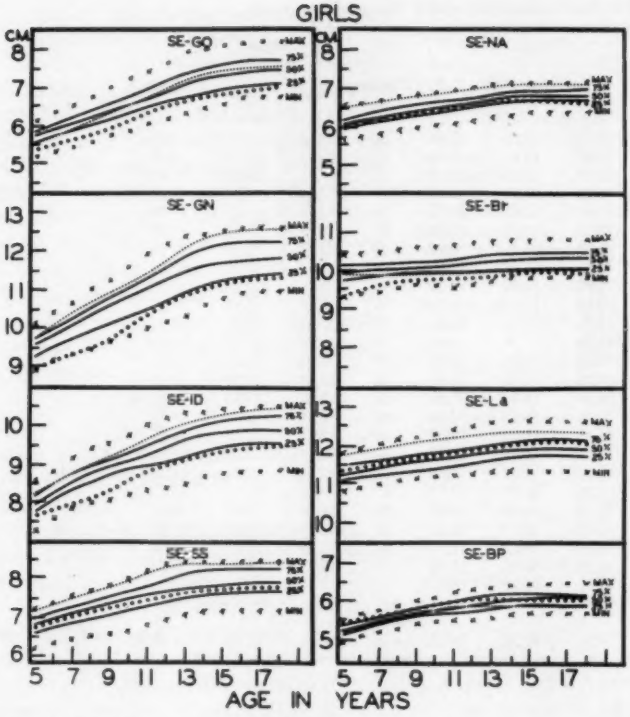


Fig. 10 (Girls) • Percentile graphs for facial and cranial dimensions with maximum and minimum. Facial and cranial dimensions of two girls (no. 98 • • • • and no. 67 . . . .) plotted on percentile standards for each dimension

represents a rising relative growth rate curve until it reaches the peak and once again assumes the downward trend. The period from the point of maximum growth rate until the growth rate slows to zero is the negative acceleration period.

The three columns in Table 4 indicate the mean time of positive acceleration in various facial dimensions and in body height and minimum and maximum time taken by certain individuals. In certain individuals the positive acceleration period was small, meaning a short adolescent spurt, whereas in others this was prolonged for a greater length of time. In boys the time of positive acceleration increases from the sella-nasion to the sella-gnathion dimension, where it is maximum. The sella-gonion dimension in the group took the same time for positive acceleration as the sella-infradentale dimension. In girls, this time increases progressively from sella-nasion to sella-gonion, being maximum in sella-gonion. It seems that, irrespective of the starting point of positive acceleration, the various facial dimensions take approximately the same time to reach the maximum. In Table 4 the minimum time taken by sella-nasion and sella-subspinale was zero,

Table 2 • Time in years of maximum circumpuberal growth

25 boys				24 girls			
Series no.	Face	Cranium	Body height	Series no.	Face	Cranium	Body height
29	12.75	12.75	12.40	26	9.25	0	9.70
62	12.45	12.92	13.70	41	10.25	10.15	9.95
4	12.75	12.75	12.05	39	11.75	11.75	11.40
89	13.25	13.25	13.40	77	10.35	10.75	11.60
23	13.05	13.50	13.30	70	11.75	0	11.90
49	13.15	13.25	12.85	90	11.75	11.75	11.82
10	13.25	13.25	13.40	53	12.75	12.75	11.55
100	13.75	14.08	13.75	104	11.65	11.92	11.25
65	13.95	14.75	14.20	99	11.75	12.25	11.40
30	13.75	13.75	13.70	95	12.25	11.92	11.30
92	13.75	13.75	13.30	78	12.25	12.25	11.60
83	13.25	0	14.35	9	12.25	12.25	12.05
28	14.25	14.08	14.10	79	12.25	12.25	12.40
85	14.25	14.58	13.70	44	12.25	12.25	13.00
51	14.25	14.25	14.55	106	12.25	11.75	11.42
82	14.35	14.25	13.60	110	12.15	12.41	11.92
32	14.75	15.00	14.40	69	12.75	12.75	12.25
66	14.75	15.08	14.50	46	12.75	12.75	11.92
109	15.25	15.25	15.55	103	12.75	12.42	11.80
108	15.25	15.25	15.15	71	13.15	12.75	13.10
42	15.29	15.75	15.90	87	13.25	12.75	13.25
92	15.85	15.75	15.55	67	13.25	13.08	12.00
17	16.05	15.25	15.70	73	13.25	13.25	13.05
52	16.25	16.25	15.50	3	13.25	13.08	13.05
96	16.75	15.00	15.55				
Mean years	14.26	14.32	14.17	Mean years	12.41	12.25	11.86

Table 3 • Frequency of circumpuberal maximums in five facial dimensions in relation to the circumpuberal maximums in body height*

25 boys						
	0–3 mo.	3–6 mo.	6–9 mo.	9–12 mo.	12–15 mo.	Total
Before	5	2	1	0	2	10
After	4	6	3	0	1	14
24 girls						
	0–3 mo.	3–6 mo.	6–9 mo.	9–12 mo.	12–15 mo.	Total
Before	3	1	1	0	1	6
After	5	5	1	4	2	17

*The maximums were the same for one boy and one girl.

because no adolescent changes were recorded in these dimensions in some individuals, as explained before.

The average duration of positive acceleration for the five facial dimensions and for body height in boys is 2.57 and 2.60 years respectively, a difference of only 0.03 year. In girls, this period of positive acceleration of the adolescent growth of facial dimensions and of body height averages 1.84 years and 2.26 years, with the difference being 0.42 year.

HEIGHT AND SKULL MEASUREMENTS DURING SPURT IN GROWTH

To compare the percentage of various skull dimensions with the body height, the age of onset of adolescent acceleration in body height and the age of termination of height growth are ascertained for each individual. In the individual, the body height and the eight skull dimensions are all measured at these two chosen ages. The chosen ages differ, however, from one child to the next. The percentage gain was computed by the short formula given below:

$$\left(\frac{y_2 - y_1}{y_1}\right) 100,$$

where y_1 and y_2 are the values at the beginning and the end of the time period, respectively.

Figure 11 shows the percentage gain in body height and various skull measurements. The percentage gain in the sella-gonion dimension is about the same as in the body height of the group. This percentage gain decreases from the sella-gonion toward the sella-bregma and sella-lambda dimensions, in which it is least. There is some percentage gain in sella-Bolton Point dimension. As has been explained, this dimension shows distinct adolescent growth.

The percentage gains in the five facial dimensions of one individual plotted on a frequency graph generally do not overlap, as shown by x marks for two individuals on the graph.

COMPARISON OF CIRCUMPUBERAL GROWTH IN SIBLINGS

In this study there are 12 pairs of siblings. One group is made up of six pairs of male siblings, a second group is composed of five pairs of female siblings and the third group consists of one pair of a male and a female sibling.

Table 5 gives the time of maximum circumpuberal growth spurts of the face and the body height of the siblings under consideration. As can be seen, these groups of siblings tend to mature about the same time, except that in the case of pair no. 3 in group I the difference between the circumpuberal maximums is about two years. That is, if one member is late maturing in facial growth the other tends to follow the pattern. The male and the female sibling of group III are both late maturing in their respective sex groups of this sample. Similar relation in the growth of long bones among siblings was found by Maresh.[8]

Table 4 • Duration of period of positive acceleration in facial dimensions and body height

Boys			
Dimension	Mean years	Minimum years	Maximum years
Sella-nasion	2.21	0	4.00
Sella-subspinale	2.56	1.00	4.00
Sella-infradentale	2.62	1.50	4.00
Sella-gnathion	2.86	1.50	4.50
Sella-gonion	2.62	1.50	4.50
Mean	2.57	1.37	4.10
Body height	2.60	1.05	3.90
Girls			
Dimension	Mean years	Minimum years	Maximum years
Sella-nasion	1.70	0	3.50
Sella-subspinale	1.74	1.00	3.50
Sella-infradentale	1.82	1.00	4.50
Sella-gnathion	1.94	1.00	4.50
Sella-gonion	2.00	1.50	4.00
Mean	1.84	1.13	4.00
Body height	2.60	0.80	3.60

SEX DIFFERENCE

The absolute gain in centimeters during the circumpuberal growth in eight skull dimensions, measured from the lateral cephalometric roentgenograms, was examined on 19 boys and 21 girls. Means and variances for each dimension were computed separately for boys and girls. The mean of each dimension for boys was then compared with the similar mean

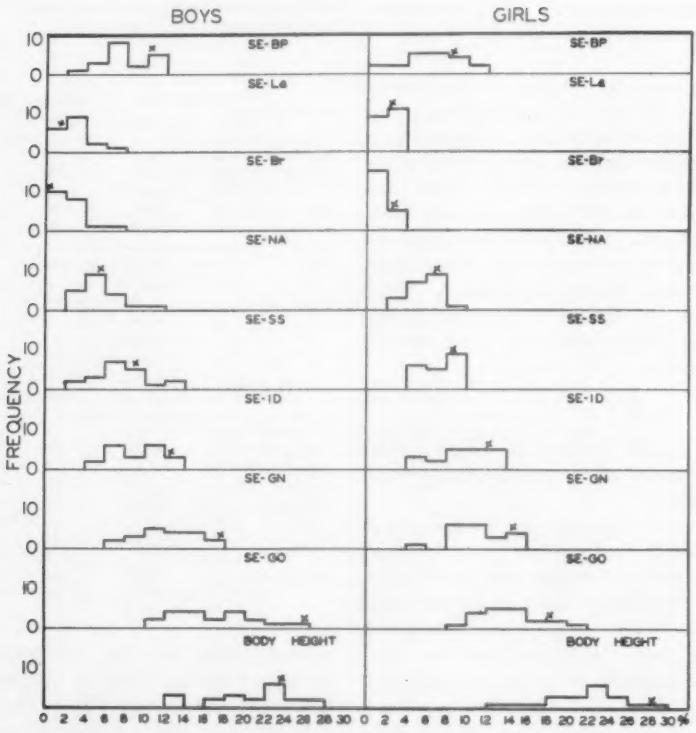


Fig. 11 • Frequency graph of percentage gains in facial and cranial dimensions and body height for boys and girls during circumpuberal growth period. X indicates position of one boy and one girl

for girls. An "F" test supported the assumption that the variances of the two sexes were unequal. Although the "T" test appears to yield the appropriate statistic for comparing means in this situation, the degrees of freedom for each comparison permitted the use of the critical ratio as a good approximation. The results are given in Table 6. There is no significant difference in sella-Bolton Point and sella-bregma between the two sexes at the .05 level. A significant difference was found in sella-lambda at the .05 level. A significant difference was found in the sella-infradentale at the .01 level. Significant differences were found to be present in the sella-nasion, sella-subspinale, sella-gnathion and sella-gonion at the .001 level.

DISCUSSION

Most of the studies on skull growth in the past have been limited to either the face or the cranium. The major difference of the present study is that it incorporates both the sections of the skull. The present study would have been impossible without longitudinal records, thus clearly bringing out the advantages of such data. The method of relative rates of growth proved to be highly useful in revealing

the individual growth pattern, especially during the adolescent period.

The use of sella-nasion as a line of orientation has been satisfactory for the most part, but in certain individuals the nasion showed a considerable upward shift, producing a clockwise rotation of the tracings of certain individuals and giving a false picture of growth.[27] The Bolton Point still remains the most difficult point to pick up on the lateral cephalometric roentgenograms in spite of the suggestion given by Henkle.[28] The finding of a small increase in the sella-bregma dimension agrees with the observation made by Roche,[29] that there is a small increase in cranial thickness perceptible up to the age of 17 years. The relatively greater increment of sella-lambda indicates that the main increase in length of the skull after the first few years occurs because of the increase in size of that part of the skull.[30] The finding that the face continues to grow after the growth in body height is completed agrees with similar findings that have been reported by Baer.[31]

The individual cases deviate considerably in almost every detail from the average growth changes.[32] Though conducted in greater detail, the present findings closely relate to the study on facial growth by Nanda,[19] on a smaller sample from the same records using different dimensions. There is a definite circumpuberal growth period in the face, occurring just after the growth spurt in body height. The individual tends to maintain his relative position, and there is constancy of growth pattern within the individual though the growth pattern does vary from one individual to another. The adolescent growth curves reveal that the various dimensions of the face in the same individual tend to reach the maximum rate of growth at about the same time, and the spread is apparently not as great as observed by Nanda.[19] It is possible to estimate the time of onset of the adolescent growth spurt in the face by observing the time of onset of similar spurt in body height.

Table 5 • Comparison of time of maximum circumpuberal growth spurt in siblings

	Pairs no.	Age (in years) for maximum growth rate of face	Age (in years) for maximum growth rate of body height
Group I	1	16.25	16.25
		16.05	15.25
Six pairs of males siblings	2	16.75	15.00
		15.25	15.25
	3	15.85	15.75
		13.75	13.75
	4	14.75	15.00
		14.25	14.08
	5	13.95	14.75
		13.75	14.08
	6	13.25	13.25
		12.75	12.75
Group II	1	13.25	13.25
		13.25	13.08
Five pairs of female siblings	2	12.75	12.75
		12.25	12.25
	3	12.25	11.75
		10.25	10.50
	4	12.25	12.25
		11.75	11.75
	5	11.75	12.25
		11.65	11.92
Group III	Male	14.75	14.50
One male and one female sibling	Female	13.25	13.05

The present findings for the most part agree with Broadbent,[14] and Brodie[15] that the facial pattern once established never changes. This can be seen in Figure 10, where the various facial dimensions of the individuals illustrated tend to maintain the same relative position in the group from 5 to 18 years, although there may be slight changes in the facial growth pattern brought about by the different rates of growth in various dimensions.

There is a definite preadolescent growth spurt which, according to Brodie's[15] statement, was completely absent in his study. However, careful examina-

Table 6 • Absolute gain in centimeters during circumpuberal spurt in growth of cranial and facial dimensions measured from the lateral skull roentgenograms

Dimension	Mean boys	Mean girls	Variance boys	Variance girls	Difference	Critical ratio
Sella-Bolton Point	.4164	.3952	.0316	.0301	+.0212	.38
Sella-lambda	.3368	.2373	.0238	.0109	+.0995	2.37*
Sella-bregma	.2267	.1400	.0496	.0116	+.0867	1.55
Sella-nasion	.4944	.3643	.0230	.0064	+.1301	3.34†
Sella-subspinale	.7500	.5582	.0328	.0194	+.1918	3.76†
Sella-infradentale	1.1268	.9030	.0755	.0761	+.2238	2.57‡
Sella-gnathion	1.7066	1.2332	.1026	.0921	+.4734	4.78†
Sella-gonion	1.3049	.9304	.0686	.0387	+.3745	3.86†

*$P < .05$
†$P < .001$
‡$P < .01$

tion of the facial composites prepared by him do seem to show the presence of such a growth spurt.

SUMMARY AND CONCLUSION

A quantitative analysis of eight skull measurements on serial lateral cephalometric roentgenograms of 25 boys and 25 girls enrolled in the growth study at the Child Research Council in Denver was conducted. The ages of the individuals studied ranged from 1 month to 30 years. The main interest in these skull measurements centered around the adolescent growth period, relating facial and cranial growth to the growth in body height. The skull measurements used were sella-Bolton Point, sella-lambda, sella-bregma, sella-nasion, sella-subspinale, sella-infradentale, sella-gnathion and sella-gonion.

The growth patterns of the previously mentioned dimensions were studied by using the relative rates of growth. The following conclusions can be drawn from the study:

1. The face shows the characteristic skeletal growth pattern, including distinct adolescent changes, with the time of maximum growth spurt occurring usually a little after the spurt in body height.
2. The cranium tends to follow the neural type of growth but occasionally shows a small adolescent growth spurt. The skull base tends to follow a growth pattern which is in between the neural and the skeletal types.
3. The face continues to show a small increment of growth after the growth in body height is completed, more so in boys than girls.
4. In addition to the circumpuberal growth spurt, a distinct childhood growth spurt occurs in most instances. Occasionally irregular secondary spurts were found on the descending arm of the circumpuberal rate curves.
5. The duration of positive acceleration of growth of facial structures during adolescence compared closely with the corresponding acceleration of growth in body height of boys, whereas in girls it was considerably less.
6. The percentage gain in skull dimensions during the circumpuberal growth period demonstrates the regular pattern of growth of various facial dimensions in a given individual.
7. The girls had smaller absolute measurements with a slower rate of growth, and tended to mature about two to three years earlier than boys.
8. A comparison of the time of maximum circumpuberal growth spurt in a small group of siblings suggests that they tend to mature at about the same time.
9. A significant sex difference in absolute gain during the adolescent growth period of the face was demonstrated.
10. The present study shows that facial growth is similar to growth in body

height, and that facial and body skeletal growth have many characteristics in common. By use of the method of relative rates, the growth changes in face and cranium can be visualized more clearly.

This study may be useful to the orthodontist in understanding the process of growth with which he deals constantly for diagnosis and for the planning of treatment of the individual case.

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Scientific Attitude • The trouble with the world today, most scientists believe, is not that there is too much science but rather that the scientific attitude—the essence of science—is far too little understood and too inadequately applied to human problems. Even among scientists themselves, outside their own specialties, the scientific attitude is far too rare and is never fully developed. *Robert S. Mulliken. On the Art of Being a Scientist. I. How a Scientist Thinks. Context 1:12 Spring 1961.*

Use of bemegride in conjunction with thiopental sodium anesthesia

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In 200 patients after thiopental sodium anesthesia for extraction or oral surgery, bemegride was administered intravenously, in a dose of about 50 mg. (10 cc.) to eliminate the effects of barbiturate narcosis. Over-all recovery time was reduced from an average of 45 minutes to about 5 minutes in most patients. Fourteen case reports illustrate the treatment.

One of the basic requirements in general anesthesia in the dental office is the elimination of the effects of narcosis in a suitable time to permit the patient to leave the office.[1] This study was conducted to determine the usefulness of bemegride (Megimide) (*beta*-ethyl-*beta*-methylglutarimide) in terminating anesthesia induced by a short-acting barbiturate, thiopental sodium. This drug was selected because it has been reported to counteract effectively central nervous system depression produced by barbiturates.[2,3]

SUBJECTS AND METHODS

Two hundred consecutive patients between the ages of 12 and 65 years were given thiopental sodium anesthesia for extraction of teeth or for other forms of oral surgery. All procedures were carried out in the office, and all were followed by administration of bemegride.

The anesthetic routine carried out may be outlined as follows:

After the patient is comfortably seated in a semireclining position with his arm secured to an arm board, the anesthetic administration is started with 2.5 per cent thiopental sodium in sodium chloride injection. During the first 5 cc. administration, the patient is also given 0.4 mg. (1/150 grain) of atropine sulfate. If sufficient drying of the oral secretions does not occur during the induction period, the dose of atropine is repeated.

Up to 500 mg. (20 cc.) of the thiopental sodium solution may be required before the patient is sufficiently anesthetized so that a towel clip may be used to pull the tongue forward and the throat may be packed. Powerful suction is used to eliminate the oral secretions, blood, and debris. After use of between 500 and 1,000 mg. of thiopental sodium to accomplish the procedure, which averages about 12 minutes in length, the recovery time is ordinarily about 45 minutes. For the recovery period, the patient is removed from the operating room while still under light surgical anesthesia and taken to the recovery room.

RESULTS

With the use of bemegride, approximately 50 mg. (10 cc.) intravenously, visual and tactile sensations in patients are re-estab-

lished in from three to five minutes. Often patients are nearly able to help themselves to the recovery room, and in many instances a recovery period is not necessary. The patient is allowed to return home provided that he is accompanied by a friend as a precautionary measure.

The reversal of the symptoms of a classical anesthetic are fairly easy to ascertain. Since the average dose of thiopental sodium which we employ is 500 mg. (20 cc.), this dosage was used in evaluating the signs of recovery from surgical anesthesia. After this dosage, the re-establishment of pain perception occurs on an average of 2½ minutes, hearing perception in 3 minutes, sight perception undetermined, and balance control in 20 minutes.

No attempt was made to conduct a critical analysis of the fine points in the rapid recovery after using bemegride. From the point of view of practical evaluation, it was found that over-all recovery time was reduced from 45 minutes to approximately 5 minutes in most patients.

CASE REPORTS

The following case reports are illustrative of the clinical response to bemegride.

Case 1 • A 45 year old man was referred to the investigator with a root of an upper left first molar displaced into the maxillary sinus. A second division block was given together with a deep analgesia, using thiopental sodium. The analgesia progressed beyond the point of analgesia, and, since there was considerable pharyngeal hemorrhage from the postnasal region, it was deemed necessary to re-establish the cough reflex as soon as possible. Therefore, 50 mg. of bemegride was given, and the cough reflex was re-established at once.

Case 2 • A 45 year old man developed a laryngospasm after 500 mg. of thiopental sodium had been administered. There was considerable cyanosis and respiratory paralysis. Medication included 3 mg. (1 cc.) of tubocurarine chloride, 2 mg. (2 cc.) of succinylcholine chloride, forced oxygen, and 50 mg. of bemegride. The anesthetic was smoothed out to such an extent that the necessary work was completed without further medication. The patient was awake within 5 minutes and able to help himself to the recovery room.

Case 3 • A 32 year old woman had one extraction performed. Thiopental sodium, 375 mg. (15 cc.), was given along with 1.5 mg. of tubocurarine chloride and 50 mg. of bemegride. The patient was awake within 3 minutes after bemegride was given and was able to help herself to the recovery room.

Case 4 • A woman, age 37, had an extraction of six anterior teeth, alveolectomy, and insertion of an immediate denture. Medication included 875 mg. (35 cc.) thiopental sodium, nitrous oxide-oxygen 50:50, tubocurarine chloride 1.5 mg., and 50 mg. of bemegride. Operating time was 20 minutes. The patient was awake within 5 minutes after bemegride was given and was able to help herself to the recovery room.

Case 5 • A 27 year old man had an impacted lower third molar removed. Medication included 1.05 Gm. (42 cc.) of thiopental sodium, nitrous oxide-oxygen 50:50, 3 mg. of tubocurarine chloride, and 50 mg. of bemegride. The patient was awake and talking coherently within 2 minutes after administration of bemegride.

Case 6 • A 16 year old girl was given anesthesia for extraction of three teeth. Medication included 600 mg. (24 cc.) of thiopental sodium, nitrous oxide, 1.5 mg. of tubocurarine chloride, and 50 mg. of bemegride. Duration of anesthesia was 18 minutes; recovery time after administration of bemegride was 3 minutes.

Case 7 • A woman, age 50, had extraction of eight teeth with alveolectomy. The operation required 20 minutes. She was given 775 mg. (31 cc.) of thiopental sodium, nitrous oxide, 1.5 mg. tubocurarine chloride, and 50 mg. of bemegride. The patient was removed to the recovery room and was sufficiently recovered after 10 minutes to be coherent.

Case 8 • A 60 year old woman had an extraction of six maxillary teeth, alveolectomy, and insertion of an immediate denture. Medication included 625 mg. (25 cc.) of thiopental sodium, nitrous oxide, 1.5 mg. of tubocurarine chloride, and 50 mg. of bemegride. Recovery time was 20 minutes. On two previous occasions when the patient had received thiopental sodium without bemegride, recovery times had been 30 and 45 minutes, respectively.

Case 9 • A woman, age 58, had an extraction of six teeth and preparation of the ridge for an immediate denture. The operating time was 20 minutes. Medication included 575 mg. (23 cc.) of thiopental sodium, nitrous oxide, 3 mg. of tubocurarine chloride, and 50 mg. of bemegride. The recovery time was 6 minutes, after which time the patient was able to help herself to the recovery room.

Case 10 • A 23 year old woman had a lower third molar extracted. Medication included 500 mg. (20 cc.) of thiopental sodium, nitrous oxide, 3 mg. of tubocurarine chloride, and 50 mg. of bemegride. Operative time was 5 minutes, recovery time was 5 minutes, and the patient was able to leave the office in 30 minutes.

Case 11 • A man, 19 years old, had one tooth extracted. Medication included 475 mg. (19 cc.) of thiopental sodium, nitrous oxide, 3 mg. of tubocurarine chloride, and 50 mg. of bemegride. Operative time was 8 minutes, and recovery time was 2 minutes.

Case 12 • A 38 year old woman had three teeth extracted. Medication included 575 mg. (23 cc.) of thiopental sodium, nitrous oxide, 1.5 mg. of tubocurarine chloride, and 50 mg. of bemegride. The patient was awake within 5 minutes.

Case 13 • A 65 year old woman had extraction of her eight remaining upper teeth, alveolectomy, and sutures. The patient appeared to be anemic, blood pressure was 120/80, and she had edema of the ankles. Initial medication was 20 mg. (1 cc.) of methamphetamine (Desoxyn) hydrochloride, which brought the blood pressure to 140/100. Additional medication included 275 mg. (11 cc.) of thiopental sodium, nitrous oxide-oxygen 50:50, 40 mg. of methamphetamine hydrochloride, and 50 mg. of bemegride. The patient was awake within 5 minutes after administration of bemegride.

Case 14 • A woman, age 55, had an extraction of six remaining upper teeth, alveolectomy, suturing and insertion of the upper denture. On two previous occasions, she had received 375 mg. (15 cc.) and 500 mg. (20 cc.) of thiopental sodium, respectively. On this occasion, 750 mg. (30 cc.) of thiopental sodium was given. She was able to help herself to the recovery room after administration of 50 mg. of bemegride and was able to leave the office within 30 minutes.

COMMENTS

Patients with low blood pressure, various debilitating diseases, or who are alcoholics may be carried to a far deeper plane of anesthesia than anticipated. Occasionally respiratory arrest may occur, and in such instances the prompt use of bemegride is indicated. In this series of 200 patients, respiratory arrest occurred in four patients (two with low blood pressure, one

with a debilitating disease, and one who was an alcoholic). In all patients, respiration was promptly restored after administration of 50 to 100 mg. of bemegride. In a few instances in which blood pressure dropped below desirable levels, methamphetamine hydrochloride (20 mg.) was administered intravenously. Although no instance of circulatory collapse was observed, we took the precaution of having 100 mg. (1 cc.) of pentylenetetrazol (Metrazol) on hand for possible emergency use as a respiratory stimulant.

Bemegride was found to be especially valuable when a hospitalized patient has undergone extensive oral surgery, for example, reduction of multiple facial fractures, and it is advisable to give intravenous fluids. After surgery, the residual thiopental sodium is liberated at such a rate that a very prolonged anesthetic recovery is usually experienced. The judicious use of bemegride shortened the recovery period of the patients in this study.

SUMMARY AND CONCLUSIONS

Bemegride was used routinely in 200 patients after thiopental sodium anesthesia for extraction or oral surgery. In the majority of patients, visual and tactile sensations were established in from 3 to 5 minutes after administration of 50 mg. of bemegride. The drug acts as a central nervous stimulant, counteracting the central-depressant effects of barbiturates.

It is concluded that bemegride is a safe and effective agent for eliminating the effects of barbiturate narcosis after extraction of teeth or after oral surgery.

816 Argyle Building

Bemegride (Megimide) used in this study was supplied by Abbott Laboratories.

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Man as Manipulator • Man, as a two-handed manipulator of the world about him, has projected himself outward upon his surroundings in a way impossible to other creatures. He has done this since the first half-human man-ape hefted a stone in his hand. He has always sought mastery over the materials of his environment, and in our day he has pierced so deeply through the screen of appearances that the age-old distinctions between matter and energy have been dimmed to the point of disappearance. The creations of his clever intellect ride in the skies and the seas' depths; he has hurled a fragment of metal at the moon, which he once feared. He holds the heat of suns within his hands and threatens with it both the lives and happiness of his unborn descendants. *Loren Eiseley, Nature, Man, and Miracle. Horizon 11:27 July 1960.*

Controlled study on removal of mandibular third molars: effect of an enzyme mixture on sequelae

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In each of 60 patients who had bilateral lower third molar extractions, one tooth was removed while the patient was receiving enteric-coated trypsin tablets and the second tooth was removed at a later sitting without the use of the enzyme. In the enzyme-treated patients, swelling was considerably less, and dry socket and external ecchymosis were less frequent. There were no side effects from the use of the enzymes. Six tablets on the preoperative day, six tablets on the day of operation, and four tablets on the first postoperative day comprised a satisfactory dosage.

Even the most experienced oral surgeons encounter complications in the removal of lower third molars. Hinds[1] discusses the various methods of minimizing surgical trauma and describes drugs available to the oral surgeon for suppression of edema. Among these, the parenteral use of the enzyme, trypsin, was found to be beneficial; however, it is not recommended for routine use in oral surgery because of inconvenience and side effects.

Recently enteric-coated tablets of trypsin have become available. Should they produce, on clinical trial, the same effect as intramuscular injections of trypsin, then the tablets should be acceptable generally. Inconvenience of intramuscular injections of trypsin and pain at the site of injection would cease to be a problem.

It is the purpose of this paper to present the results of a controlled study designed to evaluate trypsin tablets for prevention of postoperative edema.

Several papers have appeared on the effect of trypsin in oral surgery. Using the intramuscular route, Paul and Naplicic[2] gave trypsin preoperatively to a small series of patients who had less swelling after root resection than did patients not given the trypsin. Schneider[3] reported a double blind study on 100 patients. Four injections of trypsin in gelatin solution, or of gelatin alone, were given at 12 hour intervals, starting the evening before surgery and ending the postoperative morning. Swelling measured 3 to 4 times as much in the placebo group as in the trypsin-treated patients. Schneider recommended intramuscular injection of trypsin as adjunctive therapy in procedures expected to be traumatic. Intramuscular trypsin was also used by Spiegel[4] as part of the treatment of refractory dry socket. He commented on the effectiveness of trypsin in hastening healing and in prevention of inflammation in traumatic surgical procedures.

Hanratty[5] conducted a controlled pilot study comparing buccal tablets of trypsin and a placebo in regard to their effect on inflammation after the extraction of mandibular third molars. Patients were selected who had both lower third molars impacted. One tooth was extracted while the patient was taking trypsin; the other tooth when a placebo was being given. He found fewer signs of inflammation in the patients taking trypsin than in those on placebos.

CLINICAL STUDY

In the study to be described herein, comparison was made between postoperative reactions when enteric-coated trypsin tablets were used and when they were not in duplicate procedures in the same patient. The tablets were Orenzyme, each of which contained trypsin 68 per cent, chymotrypsin 30 per cent and ribonuclease 2 per cent in an amount equal in proteolytic activity to 20 mg. of trypsin. Sixteen tablets were given to each patient on a dose schedule of two tablets three times daily on the preoperative day and again on the day of operation, then one tablet at meals and at bedtime on the day after operation.

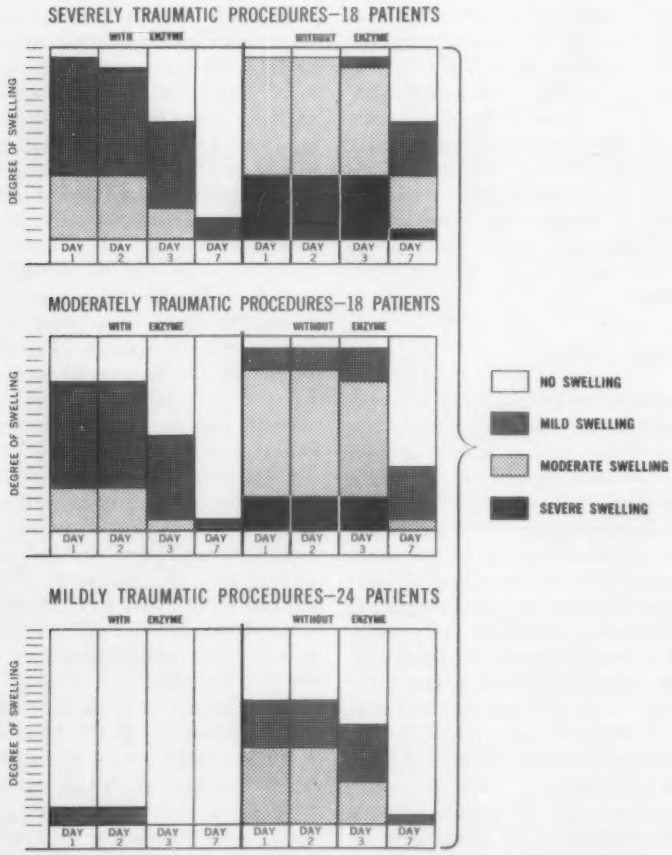
The subjects were 60 private patients who were treated in the office. For the most part they were young healthy adults averaging 27 years of age with a range of 14 to 46; 30 were men and 30 women. Patients with pericoronitis and with other complicating infections were excluded. With this exception, the study included all patients who required extraction of both lower third molars. All but four patients showed some evidence of subacute or chronic oral infection.

In every instance, the tooth which appeared most severely involved was removed first under enzyme therapy. The other tooth was extracted 2 to 6 weeks later without enzyme. As nearly as possible, all surgical procedures were identical for extraction of both teeth. In each patient at both operations, the same anesthetic agent was used at the same concentration, the same analgesic was prescribed, and the same instructions were given on postoperative care and on the local use of ice. For anesthesia, 44 of the patients were given thiopental sodium, 15 a local anesthetic, and one no anesthetic. All patients were instructed not to rinse their mouths on the day of operation and to apply ice 20 minutes on and 20 minutes off for 8 to 12 hours. As an antibiotic, a combination of tetracycline phosphate and novobiocin sodium (Panalba) was prescribed routinely to all patients with evidence of infection, one standard strength capsule every six hours for a total of five capsules. Fifty-six of the patients took the antibiotics, and four who showed no evidence of existing infection were given none. For analgesia, meperidine hydrochloride 50 mg. was prescribed for four patients, APC with codeine for 43 and APC tablets for 13 patients. In each instance the prescribed dose was one tablet every four hours as required for pain.

The patients were divided into three groups, depending on the difficulty of the procedure and the trauma inflicted. Evaluation of results in each group was based on swelling, trismus, pain and complications including osteitis and ecchymosis visible over the submandibular region. Swelling and trismus were graded on a scale 0 to 3 indicating absent, mild, moderate or severe. Pain was graded on the number of days it was present. Evaluations were made on the first, second, third and seventh days postoperatively except in patients who were discharged before the seventh day as asymptomatic.

RESULTS

Swelling • The amount of swelling at each day of observation is shown in the illustration for the 18 patients with severe trauma, the 18 requiring moderately traumatic procedures, and the 24 requiring



Swelling observed after extraction of mandibular third molars

mildly traumatic ones. The height of the columns represents the percentages of the total group who manifested the different degrees of swelling. On the first and second days, in those requiring severely traumatic procedures, the swelling after the operation when the enzymes were used was mild to moderate and that after the control operation, moderate to severe. By the third day, the swelling had lessened considerably in the enzyme group but not in the controls, and by the seventh postoperative day there was virtually no residual swelling in the group receiving trypsin though there was still a good bit of swelling in the controls. The 18 patients subjected to moderately traumatic procedures followed a similar pattern. The swelling when enzymes were given fell from a predominantly mild level to mild-to-none by three days and disappeared in all but one patient by the seventh day. The swelling when the enzymes were not used was predominantly moderate for the first three days and some swelling was still present in six pa-

tients on the seventh day. The swelling in the 24 patients requiring mildly traumatic procedures was blocked by the enzymes in most instances. In more than half of the extractions done without the enzymes, swelling was mild to moderate for three days.

In the 18 requiring severely traumatic procedures, 17 showed less edema after the operation when enzymes were used, and one showed less edema after the control procedure. In the 18 requiring moderately traumatic surgery, 17 again showed less edema when the enzyme was used, and one showed the same amount of edema after both extractions. In the 24 requiring mildly traumatic procedures, 15 of the patients who were given enzymes had less edema; 7 showed the same amount of edema after both extractions, and in 2 patients the control procedures showed less edema.

In summary, 49 of the 60 patients showed less swelling when the enzyme was utilized as compared with three patients who showed less swelling when the enzyme was not given.

Trismus • The amount of trismus one day after surgery is shown in the table. In the groups requiring severely traumatic surgery, 55 per cent of the control operations done without enzyme therapy were followed by moderate to severe trismus. In groups who took enzymes, only a mild degree of trismus was present in 45 per cent of the patients. The incidence of trismus was low for both extractions in all patients subjected to less traumatic surgery.

Pain • Pain values were difficult to assess. The analgesic drugs as specified earlier were sufficient to control discomfort in most instances, though for two of the extractions when trypsin was not given, meperidine was required after APC with codeine failed to control the pain. Three extractions without enzyme required APC with codeine, whereas APC tablets had been sufficient when enzyme tablets were used. In no instance was it necessary to increase the potency of the analgesic drug originally prescribed after extraction under enzyme therapy.

Miscellaneous Complications • In one patient using enzymes, osteitis occurred after extraction, and it occurred in 11 patients in the control group. Ecchymosis was observed over the submandibular region in one patient who was taking enzymes, and in 13 who were without enzymes. In each patient taking the enzymes in whom a complication appeared after the extraction, the complications were more severe after the second procedure when no enzyme was used.

No untoward reactions to the enzyme tablets were observed in the entire series of patients.

DISCUSSION

If there was any evidence of partial or total loss of clot in the socket and sec-

Table • Amount of trismus one day after surgery

Patients undergoing:		Trismus			
		Absent	Mild	Moderate	Severe
Severely traumatic procedures	with enzyme	10	8	0	0
	without enzyme	7	1	5	5
Moderately traumatic procedures	with enzyme	16	2	0	0
	without enzyme	15	2	0	1
Mildly traumatic procedures	with enzyme	23	1	0	0
	without enzyme	23	1	0	0

ondary infection from the saliva, the condition was considered osteitis. It was treated by inserting an antiseptic dressing which was changed every 2 or 3 days until healing took place.

It is of interest to note here that the patient who developed osteitis after both extractions showed total disregard for postoperative instructions and, indeed, for sound oral hygiene. His third molars were placed horizontally and there was a large dentigerous cyst inferior to the right lower third molar which was extracted first after enzyme administration. Osteitis developed on the third day but by the seventh day it had cleared up. The left molar was extracted three weeks later; this extraction was followed by a large amount of edema. By the second day osteitis developed and caused a moderate amount of pain for 16 days. Both procedures were considered moderately traumatic.

In this study, practical clinical procedures were followed throughout. It has always been our practice to remove the more difficult tooth first; in 34 instances, tooth no. 17 was the first one removed and in 26, no. 32. No difference was expected in traumatic sequelae and complications between the two sides of the jaw, and none was present. The enzyme tablets were used for the first procedure in every instance without selection of patients. In Hanratty's[5] double blind study, there was no difference in the results whether trypsin was given for the first or the second procedure, and no carry-over effect from one operation to the other was observed when the interval between procedures was about three weeks. We therefore did not alternate the enzyme between the first and second operation. However, in comparison with the Hanratty series, our results were more favorable. His patients showed some small difference in inflammation between the trypsin and the placebo operations on the first two postoperative days although there was a considerably better response to trypsin on the third day. Hanratty prescribed the buccal tablets the night before surgery; he stressed, however, that pretreatment for a longer time might improve the results.

According to our data, his premise was correct. Our findings parallel those of Schneider[3] who used intramuscular injections of trypsin the night before surgery. Stuteville and co-workers[6] used intramuscular trypsin at the time of the operative procedure and on succeeding days. He believed that swelling and inflammation, whether caused by infection or trauma, abated more rapidly if trypsin was used.

The capacity of trypsin to reverse signs of inflammation and edema after traumatic injury has been reported previously.[7,8] Also it has been demonstrated in experimental animals that best results in suppression of swelling can be obtained when the trypsin is administered in sufficient dosage before the injury has been induced. Beiler, Brendel and Martin[9] pointed out that for maximum suppression of edematous reaction, trypsin by injection should be given to animals well in advance of the inflammatory stress. With this background in mind, we started our patients at the recommended clinical dose of the enzyme 24 hours before surgery, continued with the same amount during the day of operation and then tapered off the succeeding day. Each patient was observed carefully for any rebound or increased swelling on the second and third days after surgery. In two patients who took enzymes, slightly increased swelling was seen on the second postoperative day. The same slight increase was observed more frequently in the control procedures. In most of the patients to whom enzymes had been given, the swelling had diminished appreciably by the third day; on the other hand, after the control procedures, the equivalent point of reduction was reached between the fourth and the sixth day.

The effect of the enzyme on incidence of osteitis probably can be attributed to

improved local circulation. The clinical action of trypsin has been attributed to this property.[10] Thoma[11] has suggested that inadequate circulation in the alveolus is at least contributory to the development of osteitis. A similar explanation could be given for the appearance of ecchymosis. The latter usually was not seen until the fifth to the seventh day postoperatively. Osteitis and ecchymosis occurred in some of the patients whose surgery was considered mildly traumatic as well as in some after more severe procedures.

The enteric-coated enzyme tablets have exerted the same clinical effect as intramuscular injections of trypsin in suppressing inflammation and reaction after surgical removal of mandibular third molars. The tablets were helpful in suppressing or reversing edema, not only in the severely traumatic procedures but also in the mildly and moderately traumatic operations. In the extractions in all groups not taking trypsin, there were 11 instances of osteitis compared to one in the group taking enzymes. The prevention of discomfort for the patient and of time loss for the surgeon because of this complication would be reason enough to recommend these tablets for use in dental surgery; in addition, great benefit is derived from their use in that the patients have less swelling, less pain and less visible ecchymosis.

SUMMARY

Sixty patients in private practice who had bilateral lower third molar extractions were observed for postoperative sequelae. In each instance, one tooth was removed while the patient was receiving enzyme tablets, the other at a later sitting without the use of the enzyme. In the enzyme-treated patients, swelling was considerably less, and dry socket and external ecchymosis were less frequent. There were no side effects from the use of the enzymes. Six tablets on the preoperative day, 6 tablets on the day of operation and 4 tablets on the first postoperative day were found satisfactory in our clinical study.

444 North Telegraph

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Tablets used in this study supplied by the clinical research department of the National Drug Company, Philadelphia.

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The Unexpected • Anyone who does not realize that anything can happen to anybody at anytime does not know what kind of a world we are living in. *Louis L. Mann. In Quest of the Bluebird, 1957.*

Cervicofacial emphysema after air blown into a periodontal pocket: a case report

James L. McClendon, D.D.S., and W. Clyde Hooper, Jr.,† D.D.S., Houston*

During dental examination, air from a dental unit syringe at 12 to 13 psi was blown into a periodontal pocket for better visualization. Instantaneous cervicofacial emphysema ensued. The affected tissues were soft and fluctuant and were not discolored. The patient felt no pain but a stretching feeling of the face and neck. The swelling disappeared within 72 hours.

This paper describes an instantaneous cervicofacial emphysema after use of compressed air blown into a periodontal pocket from a standard dental unit syringe. An abnormal accumulation of air or gases in lung alveoli is designated pulmonary emphysema and in subcutaneous tissues, interstitial emphysema.[1] The latter usually occurs as a result of surgery or trauma when air is forceably introduced through a break in the tissues.

REPORT OF A CASE

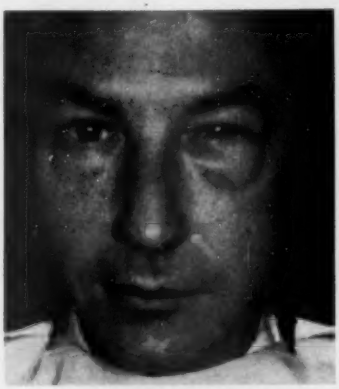
A healthy white man age 37 years was first seen for routine dental diagnosis and treatment. He had no oral complaint. Examination revealed a periodontal pocket measuring 6 mm. at the greatest depth associated with the mandibular left second bicuspid. Air from the dental unit syringe (12 to 13 psi at the compressor) was blown into this pocket for better visualization and drying of the field.

The left cheek became swollen immediately. Palpation of the tissues resulted in the spread of the swelling to the infraorbital and cervical regions (see illustration). The affected tissues were not discolored but were soft and fluctuant. There was no pitting, and crepitus was noted in the loose infraorbital areolar tissue. Palpation was discontinued because of possible spread of air into unaffected regions.

The patient experienced neither pain nor difficulty in deglutition, respiration, speech or vision. His only subjective sensation was a stretching feeling of the face and neck. He felt no apprehension until he saw himself in the mirror. He was reassured that the swelling was transitory and would not become more extensive. No progression of the swelling occurred during the four hours after the mishap. He was then dismissed. Tetracycline was prescribed.

Examination two days later revealed minimal facial swelling, which disappeared in another 24 hours. Further den-

tal treatment was uneventful during subsequent appointments. The air syringe was used judiciously.



View of patient. Note emphysema of infraorbital and cervicofacial regions

COMMENT

As early as 1900, Turnbull[2] reported that in 1870 a bugler blew "mess call" after removal of a bicuspid tooth. He immediately developed widespread emphysema affecting the face and neck. Other cases of cervicofacial emphysema have occurred after dental extraction in which the patient subsequently coughed,[3] expectorated,[4] blew his nose,[5] blew up a paper bag,[6] or played a wind instrument.[7] Similar occurrences have been reported in which air from a chip bulb syringe or compressed air from the dental unit was used to dry operative sites during surgery,[8] dental restorative procedures,[9] or endodontic therapy.[10,11] Teeth have been extracted to provide a larger avenue of escape for the entrapped air, but this treatment has not appreciably altered the duration of symptoms.[12,13] The average duration of swelling in these instances was about five days and in none did serious complications occur.

Tozier,[14] in 1904, described a technic of using compressed air from 40 to 70 pounds' pressure in the treatment of "pyorrhea alveolaris." Emphysema was not reported as occurring in from 500 to 600 patients treated by this method. Other authors[15,16] have described the use of oxygen insufflation as a therapeutic technic in the treatment of periodontal disease. Box[17] used oxygen and vaporized medicaments blown into the periodontal pocket at a pressure of 30 psi for treating diseased periodontal tissues. He described a "flash" phenomenon (hyperemia) and in a few instances emphysema which was referable to distant regions such as the eye, condylar space, tongue or mediastinum. When this occurred, Box advised discontinuance of the use of compressed air for that particular sitting. He suggested that breaks in the epithelial lining continuity or very thin epithelium of a periodontal pocket might constitute the portal of entry of gas during insufflation.[17]

Experimental investigations have shown that a rich anastomosis of vessels exists in the periodontium.[18-22] Pigments and dyes have been demonstrated in lymph vessels immediately after oxygen insufflation of the periodontal tissues.[17] The increased pressure at the nozzle aperture of a dental syringe may produce separation or perforation of the ulcerated epithelium of a periodontal pocket. Apparently, this permits air bubbles to penetrate into interstitial tissues along fibrous septae, perivascular and perilymphatic spaces.

If emphysema occurs without respiratory or circulatory disturbance, active measures to express the air are not required. Severe cervical emphysema may necessitate tracheotomy, and mediastinal involvement should be considered a medical emergency.[23] The abnormal accumulation of air is usually absorbed within a few days. Rarely does the bacterial content of air result in infection.[1] In the event of acute infectious emphysema,[24] appropriate prophylactic measures should be instituted.

It is suggested that compressed air be used judiciously during any dental pro-

cedure to prevent the occurrence of emphysema. Similar caution should be taken when water or other fluids are used with considerable force for irrigation.

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Teeth and the Eustachian Tube • It is elementary to think of the teeth in relation with pain referred to the ear, but it is doubtful if they are often associated in our minds with tubal difficulties. Young . . . demonstrated a lymphatic connexion between the teeth and the eustachian tube in monkeys. It is possible that the earache of teething infants is often due to a minor otitis media. The pink drumhead occurs too often to be ignored, and this may mean an otosalpingitis of lymphborne origin. Allied to this condition is the case of the adult patient with periodontal sepsis who comes complaining of deafness. This turns out to be of conductive type, and extraction of the offending teeth cures the deafness. *R. Macbeth, Some Thoughts on the Eustachian Tube, Proc. Roy. Soc. Med. March 1960.*

Improved cementation

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Zinc oxide and eugenol cement has a great potential for use as a cementing medium for crowns and bridges. Preliminary experiments indicate that the addition of Triamite (a stabilized mixture of esterified and free aromatic carboxylic acids) to Temrex (a brand of zinc oxide and eugenol cement) results in increased setting time, an increase in compressive strength, and an increase in solubility of the cement. Antibacterial activity also was increased. Further study of additives, such as the one described, is indicated.

The old saying, "A chain is only as strong as its weakest link," is particularly applicable to crown and bridge prosthesis where success or failure is so dependent on the cementation procedure. For more than 50 years, zinc phosphate cement has been widely used as a cementing medium for crowns and bridges. In recent years various studies have pointed out the shortcomings of this cement, including reports that the zinc phosphate cements are injurious to the pulp,[1-4] have poor sealing qualities,[5,6] and are relatively soluble in some media.[7]

The most important consideration in placing prosthetic restorations on vital teeth is to preserve the normal condition of the pulp,[8] yet teeth that have survived the abuses of preparation and impression taking are subjected, ironically, to an irritating acid cement that has the potential of destroying them. The use of protective cavity liners and varnishes has increased; however, studies have revealed various degrees of penetration to the pulp despite their use.[9,10]

An investigation by Bender, Seltzer, and Kaufman[11] that revealed the entrance of microorganisms into the tubules during full crown preparation suggested another function of the cementation procedure: therapy to the injured pulp in both temporary and permanent cementation. Since zinc oxide and eugenol cement mixtures are so effective in their therapeutic action on the dental pulp, much of our present day research is involved with improving this material for use in the permanent cementation as well as in the temporary cementation of fixed prosthesis.

Zinc oxide and eugenol cements are the least irritating of the dental cements,[12] and provide an effective seal against marginal leakage.[5,13] Their hydrogen ion concentration is pH 6-8 even at the time of contact with the prepared tooth.[14] In comparison, the pH of zinc phosphate cement at this time is below 2,[14] and free acid may be present at a pH lower than 4.7 for periods up to six hours

after the phosphate cement has set.[15] The solubility of zinc oxide and eugenol mixtures in dilute organic acids, and in distilled water, is quite similar to that of zinc phosphate cements.[16,17]

Today dentists are concerned not only with the permanent cementation of a fixed prosthesis, but also with its temporary cementation over a trial period and with the cementation of provisional protective coverage as well. Temporary cementation with zinc oxide and eugenol will prevent the pulpal injury that may occur with a phosphoric acid cement, relieve pain by its anodyne action, and permit the formation of secondary dentin.[18]

The philosophy of temporary cementation is looked upon more favorably today for many reasons, but especially because abutment teeth seem to be less sensitive to the irritation from zinc phosphate cement if they are sedated over a period of time with an anodyne temporary cement. Ewing[19] has pointed out that restorations may be cemented temporarily for periods of many months or possibly years, provided they are examined periodically. Kazis[20] observed that temporary cementation of restorations over an extended period is extremely beneficial and that immediate and permanent cementation of extensive restorative work should be avoided. McCracken[21] notes that restorations have been removed after intervals as long as three and five years without evidence of leakage or deterioration of zinc oxide and eugenol cements, and suggests postponing the final cementation of fixed restorations until evidence of the success of the restoration can be evaluated.

Recently the use of zinc oxide and eugenol as a permanent cement has increased.[22] According to Baraban,[23] there are numerous advantages to the cementation of fixed bridges with zinc oxide and eugenol cements, and it has become a frequently used procedure. Clinically, the solubility of zinc oxide and eugenol cements in the oral fluids almost equals that of zinc phosphate cements.[19] Occasionally, loosened restorations and washed out zinc oxide and eugenol cements seem to indicate a larger degree of solubility. However, lack of crushing strength and a combination of other factors may be responsible for these failures. Shortcomings in abutment preparation, ill-fitting castings, inadequately adjusted occlusion, and large opposing forces are among the factors that contribute to the breaking down of this cement.

The characteristic of a good permanent dental cement that a zinc oxide and eugenol mixture lacks is crushing strength. This physical property may be improved in a zinc oxide and eugenol mixture in various ways: by refining and decreasing the particle size of the zinc oxide powder and by incorporating zinc acetate into the mixture, as indicated in the studies of Wallace and Hansen,[24] Paffenbarger and Caul,[25] and Molnar and Skinner;[26] by incorporating dicalcium phosphate in the mixture as suggested by Roland, Kutscher, and Ayers;[27] by adding polystyrene to the eugenol as reported by Weiss;[28] and by the addition of various chelating agents as indicated by Brauer, White, and Moshonas.[29]

Laboratory studies have shown that substances such as benzoic acid decrease the setting time of zinc oxide and eugenol mixtures.[24] Related organic acids, such as citric, uric, isobutyric, and others, have been tested for this accelerating action, but with negative results.[26] However, other similar substances and derivatives seem to influence the physical and chemical characteristics of zinc oxide and eugenol cements. Some of these substances, sodium benzoate, salicylic acid and derivatives, and parahydroxybenzoic acid and derivatives, are used commercially as preservatives and show bacteriostatic and fungistatic activity at low concentrations against a wide variety of microorganisms. Research workers have been aware that the physical and chemi-

cal properties of a zinc oxide and eugenol cement may be enhanced when adequately formulated with a compatible benzoic acid derivative.[30]

A preliminary evaluation of a new material, a derivative of a substituted benzoic acid, suggests further improvement for zinc oxide and eugenol mixtures in both temporary and permanent cementation. This material, called Triamite,[31] is a stabilized mixture of esterified and free aromatic carboxylic acids of high purity. It has the following approximate composition:

Total aromatic acids, 80 per cent
As mono and tri-hydroxysubstituted acids, 30 per cent
Aliphatic esters of the aromatic acids, 50 per cent
Free aliphatic hydroxysubstituted acids, 1-2 per cent
Combined: free acids plus esters, 98-99 per cent

It is a fine, white powder with a very mild, characteristic odor, and is tasteless in lower concentrations. Triamite is only soluble in water to a limited degree, but it is soluble in methyl and ethyl alcohol, propylene glycol and eugenol. It has an extremely low order of toxicity. At the feeding rate of 1 Gm. per kilogram per day, Triamite will produce no toxic reactions in adult rats, even when fed to them for more than one year. The LD 50 appears to be of the order of 3 to 4 Gm. per kilo of body weight. It is approved by the U.S. Food and Drug Administration for use in a concentration up to 0.1 per cent in food and pharmaceuticals.

EXPERIMENTAL PROCEDURE

Five commercial brands of zinc oxide and eugenol cement were tested for the effects of Triamite on their consistency. The powder-liquid ratio required to produce a selected consistency varies from one brand to another because of different formulations. Trial mixtures of each cement, with accurately weighed powder and measured liquid, were compared with similar mixtures in which the powder of each brand contained 1 per cent Triamite. An increased fluidity was observed in each mixture containing the Triamite. Some mixes gave an increased fluidity at the start of the mix, but within 30 seconds the fluidity disappeared and the same consistency was obtained as if no Triamite were added. However, one zinc oxide and eugenol cement, Temrex,[32] showed an increased fluidity throughout the mix. Since this would allow for uniform testing, three powders of this material were made up for the preparation of physical test specimens, each containing Triamite in the following percentages: 1 per cent, 3 per cent, and 5 per cent. Temrex is a zinc oxide and eugenol cement with a small amount of zinc acetate and no rosin. The formula as indicated by the manufacturer is similar to the Formula I grouping of Wallace and Hansen,[24] except for a larger percentage of zinc acetate.

The dental profession, as of this writing, does not have a specification for zinc oxide and eugenol cements, although one may be forthcoming. Nevertheless, the testing procedures essentially followed those described in the American Dental Association Specification No. 8 for Dental Zinc Phosphate Cement.[33]

The zinc oxide powder was accurately weighed and the liquid was measured in a 1 ml. Luer syringe. The weighed amount of powder was divided into 6 portions and each portion was mixed for 10 seconds, making a total mixing time of 1 minute. For consistency tests a calibrated tube was loaded, 0.5 ml. of plastic cement was pushed onto a cellophane coated glass slab, and at 2½ minutes from the start of the mix, a total load of 120 Gm. was applied to the plastic cement for 7½ minutes. At the expiration of this time, 10 minutes from the start of the mix, the pat diameter of the cement was measured and the powder-liquid ratio was adjusted in various trials

Table 1 • The physical properties of a zinc oxide-eugenol cement* with Triamite additions (testing procedures —A.D.A. Specification No. 8)

% Triamite	P/L† ratio (Gm./ml.)	Setting time	Compressive strength (lb./in.²)	Solubility %	Film thickness (microns)
0	1.3/0.5	4′30″	2,440	1.38	23
1	1.85/0.5	8′00″	4,210	1.95	25
3	2.15/0.5	17′30″	3,640	2.60	21
5	1.85/0.5	17′00″	4,010	2.96	22

*Temrex.
†Required to produce a disk 25 ± 1 mm. in diameter.

until pat diameters of 25 mm. ± 1 mm. were obtained. This slight modification of the consistency test for zinc phosphate cement, in which a 30 mm. pat is required, allows for the use of a less fluid mixture and contains more powder than the American Dental Association standard consistency for zinc phosphate cements.

The ratio of powder to liquid which gave a 25 mm. pat was established as the selected consistency and was used for determining the setting time, the seven day compressive strength, the seven day solubility and the film thickness. Table 1 shows the results obtained.

DISCUSSION OF RESULTS

Consistency • As shown in Table 1 by the column headed powder-liquid ratio, 1.3 Gm. of powder to 0.5 ml. of liquid were required to give the selected consistency. With a powder containing 1 per cent Triamite, the fluidity of the mix was increased at this powder-liquid ratio, and 1.85 Gm. of powder to 0.5 ml. of liquid was necessary to produce the selected consistency. Similarly, 3 per cent Triamite increased the powder-liquid ratio to 2.15 Gm. per 0.5 ml. However, an increase to 5 per cent Triamite showed a drop in the powder-liquid ratio necessary to produce the selected consistency.

As shown in the column of Table 1 labeled setting time, mixtures with 3 per cent and 5 per cent Triamite were slowed down considerably, requiring approximately 17 minutes to set. Therefore, the pat diameter of each mixture was measured at 10 minutes from the start of the mix, as required, and again at 17 minutes from the start of the mix. Each pat was sufficiently viscous at 10 minutes to resist additional flow, and the measurements at 17 minutes were the same.

Under controlled conditions of temperature and humidity, different individuals may produce mixes of standard consistency with variations of the powder-liquid ratio. These variations attributed to the individual may be due to the following factors: excessive speed of spatulation, increased pressure of the spatula against the mixing surface, and the nature and direction of the manipulator's breath.

Setting Time • The addition of 1 per cent Triamite increases the setting time from 4 minutes and 30 seconds to 8 minutes, and as the amount of Triamite is increased to 3 per cent and 5 per cent, the setting time is 17 minutes and 30 seconds and 17 minutes respectively. For cementation purposes the 8 minute setting time from the start of the mix would be satisfactory, but a setting time of 17 minutes may be too long for satisfactory manipulation. Experiments with the other commercial brands of zinc oxide and eugenol cement indicated that this slowing down of the setting time is peculiar to Temrex, since the addition of Triamite to Pulpro-

tex[34] will shorten the setting time. Although other zinc oxide and eugenol cements are lengthened in setting time to some extent, the hardening time is not doubled or quadrupled as shown with this cement.

Triamite seems to impart a variable to the setting time and the consistency of some zinc oxide and eugenol compounds, which may be explained by the fact that there are different formulations for these cements. The action of the Triamite may be influenced by the following: the amount of zinc acetate in the mixture, the presence of rosin, the type of rosin, the method of compounding, the type of zinc oxide and its mode of manufacture, the presence of acquired moisture, and the shelf-life of the materials.

Strength • The fourth column in Table 1 shows the effect of Triamite on the compressive strength of the Temrex cement. As can be seen, this effect is quite radical, the 1 per cent addition of Triamite almost doubling the strength. Increased amounts of Triamite do not have an appreciable effect on the strength so that 1 per cent seems to be about optimum for addition to this material.

As previously noted, low compressive strength is a prime weakness of zinc oxide and eugenol cements. However, the exact strength necessary to lute crowns and bridges adequately to prepared teeth is not known. In fact, compressive strength may be no more essential than resistance to shearing stress and other physical properties. For example, using zinc oxide and eugenol cement mixes of filling consistency, compressive strengths of 3,400 and 5,500 pounds per square inch have been obtained.[25,35] The values for mixes of cementing consistency may be even less. Table 1 shows the compressive strength of Temrex to be 2,440 pounds per square inch at cementing consistency. The values for the compressive strength of zinc oxide and eugenol cements of filling or cementing consistency are obviously less than half the specified value (12,000 pounds per square inch) for zinc phosphate cements of cementing consistency. Yet, a study by Kaufman, Colin, and Coelho,[36] of the retentive ability of zinc oxide and eugenol cements indicated that many of the temporary cements exhibited more than half the retentive ability of zinc phosphate cement, and one closely approximated the zinc phosphate values. Apparently, the retentive abilities of these cements were not in proportion to their compressive strengths.

Solubility • The data on the effect of Triamite on the solubility of this cement were rather surprising since Triamite is quite insoluble in water. The addition of 1 per cent increased the solubility 41 per cent over that of the Temrex, and as the amount of Triamite was increased, the solubility increased in proportion. Again the 1 per cent addition of Triamite appears to be about the optimum concentration.

The solubility and disintegration of a cement obviously is of great clinical significance. It is difficult to draw practical conclusions regarding the solubility of zinc oxide and eugenol cements, however, if the solubility is to be determined by immersion in distilled water for seven days (American Dental Association Specification No. 8), since in the oral cavity this value depends somewhat on the changing chemistry of the oral fluids to which the cement is exposed.

The addition of an effective quantity of o-ethoxybenzoic acid in the eugenol, as reported by Brauer and associates,[29] increases the solubility of a zinc oxide and eugenol mixture to a greater extent than that containing the afore-mentioned recommended amount of Triamite.

According to Peyton and co-workers,[37] an antibacterial agent in a dental cement would be effective to the extent that the set cement is soluble. This may readily apply to a zinc phosphate cement. How-

Table 2 • Zones of inhibition: zinc oxide-eugenol*-Triamite

Organism	Control†	TRIAMITE		
		1%	3%	5%
Candida albicans	7 mm.	14 mm.	28 mm.	28 mm.
Bacillus subtilis	7 mm.	10 mm.	13 mm.	15 mm.
M. pyogenes var. aureus	5 mm.	8 mm.	10 mm.	10 mm.

*Temrex.
†Zones indicate the antibacterial activity of the eugenol.

ever, the reaction of zinc oxide and eugenol seems to be both a chemical and a physical process and solubility may or may not be necessary for an antibacterial agent to function in this type of cement.

The following hypothesis should be considered. In the set mix of a zinc oxide and eugenol cement, some of the eugenol may be absorbed by the zinc eugenolate, which is produced by the reaction, and also by the unreacted zinc oxide powder.[38,39] The presence of free eugenol in the set mix can be demonstrated even after several months, and this eugenol, not in total chemical combination with the other ingredients, can be extracted to some degree from the set mix.[39,40] This ability to be extracted, or freedom potential, of the eugenol may explain in part its efficacious action of continuous therapy to the dental pulp. It may also be reasoned that a drug with antibacterial action that is soluble to a degree in eugenol will continue to enhance this value since its activity will not be totally restricted within the set cement.

Film Thickness • Since the accuracy of the film thickness determination made by compressing the plastic cement between two flat glass plates under a load of approximately 100 lbs. per square inch is no better than ± 3 microns, the data show no significant difference between the four cements tested. Since all cements are made to the same consistency as determined by the slump test outlined for determining the powder-liquid ratio, this is not surprising.

ANTIBACTERIAL ACTIVITY

Since materials such as Triamite are known to have broad antimicrobial properties, it appeared cogent to appraise these properties in terms of its activity when incorporated into zinc oxide and eugenol cements. Accordingly, the following preliminary investigation was completed.

Measured zinc oxide and eugenol mixtures (Temrex) with 1 per cent, 3 per cent, and 5 per cent Triamite were molded into pellets of uniform size and shape, and their range of activity was determined by the plate assay method, using cultures of *Candida albicans, Bacillus subtilis,* and *Micrococcus pyogenes* var. *aureus.* A control pellet of zinc oxide and eugenol (Temrex) without Triamite was also included. Table 2 shows the results obtained.

DISCUSSION

Although Triamite only slightly enhances the antibacterial activity of zinc oxide and eugenol mixtures against the strains tested, its fungicidal activity is greatly enhanced (illustration).

These in vitro studies may in part explain clinical observations on the efficacy of the use of this compound to offset the production of offensive odors under temporary crowns. Provisional or permanent crowns that are maintained in the mouth with temporary cement for a short period of time seem to have an offensive odor on removal, especially when they have loosened in the mouth prior to removal. Clinical observations have indicated that the foul, nauseating smell associated with the removal of temporarily cemented restorations is eliminated by incorporating

1 per cent of Triamite into the zinc oxide powder.

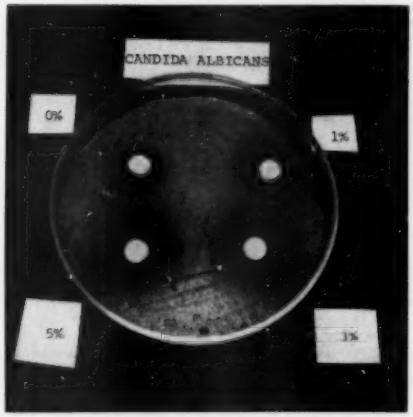
SUMMARY AND CONCLUSIONS

The present day idea of cementation differs from that of the past. Today dentists are more keenly aware of the need to protect the vital pulp from chemical irritation that may contribute to its demise, especially since the advent of the porcelain-over-metal crown has resulted in many overly-prepared abutment teeth. To offset the injurious effect of acid cementing media, calcium hydroxide liners and phosphoric acid-eugenol mixtures are used; however, these are only partially effective. There is an obvious need for a permanent cement that does not require the associated protection of the abutment teeth that zinc phosphate cement requires. Zinc oxide and eugenol cement has a great potential for this purpose if it can be formulated to increase its strength properties without unduly increasing its solubility in the oral fluids.

Clinical reports indicate that fixed restorations may be adequately maintained in the mouth with various zinc oxide and eugenol cements. One of these cements, Temrex, has been suggested for use as a permanent cementing medium.[41] The usefulness of the incorporation of various amounts of Triamite into this cement has been explored experimentally.

Preliminary experiments indicate that the addition of Triamite to a zinc oxide and eugenol mixture may be beneficial. The data show that 1 per cent Triamite is about the optimum percentage to be recommended because higher percentages prolong the setting time beyond the practical working range and increase the solubility to a large extent.

The effects of the addition of 1 per cent by weight of Triamite to the powder of Temrex cement resulted in an increase of 42 per cent of powder that could be incorporated into 0.5 ml. of Temrex liquid, an increase of 78 per cent in the time of setting, an increase of 72 per cent in the compressive strength, and an increase of 41 per cent in the solubility of Temrex. There was no effect on the film thickness. Antibacterial activity was increased.



Zones of inhibition with Candida albicans, showing fungicidal activity of a zinc oxide and eugenol cement with various concentrations of Triamite. Control pellet is at upper left hand corner and the 1 per cent, 3 per cent, and 5 per cent Triamite follow clockwise

The study and evaluation of additives, such as the one described, may be helpful in the development of a cementing medium that will fulfill the dentists' goal in the cementation of fixed prosthesis.

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Doorway of the Infinite • Thoreau once shrewdly observed, "We all occupy the region of common sense, but in the prospect of the future we are, by instinct, transcendentalists." This is the way of the man who makes nature "natural." He stands at the point where the miraculous comes into being, and after the event he calls it "natural." The imagination of man, in its highest manifestations, stands close to the doorway of the infinite, to the world beyond the nature that we know. Perhaps, after all, in this respect, man constitutes the exertion of that act which Donne three centuries ago called God's prerogative. *Loren Eiseley, Nature, Man, and Miracle. Horizon 11:32 July 1960.*

Double casting of metal to metal in full coverage

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The double casting of metal to metal in full coverage has several practical advantages. It provides a method of constructing an extremely accurate working cast and centric relation transfer which produces restorations that require a minimum of intraoral adjustment. This paper will describe the clinical and laboratory technic.

With this technic the inaccuracy associated with the seating of the dies into copings is eliminated. Indeed, with routine one piece castings, the "throwaway coping" never fits the die or the tooth the same way as the finished crown. The result is that the assembled bridge rarely fits the original cast. This error necessitates extensive occlusal correction intraorally, resulting in the mutilation of the restoration.

OUTLINE OF TECHNIC

When necessary, the occlusion is equilibrated[1-7] before abutment preparation in order that centric occlusion and centric relation coincide. The abutments are prepared, impressions are taken, and copper-plated dies constructed; gold copings of special design are fabricated and fitted to the abutments. The centric relation record is obtained by painting self-curing acrylic resin over the copings and then having the patient close his jaws in the predetermined centric relation; the remaining teeth serve as a guide. A full mouth (one piece) plaster occlusal index orients the gold copings to the remaining teeth and soft tissue.

Low-fusing metal is poured into the copings and a stone cast constructed. The maxillary cast is mounted on an adjustable articulator with the aid of a facebow; centric relation is completed by hand articulating the mandibular cast.

The final waxup is completed over the gold coping. Both the wax "overlay" and the gold coping are invested; gold is then cast to the original coping. The success of this procedure depends on the strict adherence to specific details during the laboratory phases.

PREPARATION OF ABUTMENTS

Uniform occlusal clearance of 1.5 mm. is necessary to provide enough space for the gold coping and the subsequent gold overlay. It should be emphasized that the overlay gold must have sufficient bulk, otherwise a miscast will result in the thin areas. Most often this occurs in the central fossa when the occlusal aspect of the preparation is not shaped to provide a uniform thickness of gold. The double casting technic does not require any other change in the preparation of the abutment.

Figures 1-4 • Gold copings. 1: Coping waxup. 2: Veneer copings. 3: Crinoline gauze luted to waxed-up coping for retention. 4: Sprues

GOLD COPINGS

Since the gold copings form the internal surface of the final restoration, it is essential to prevent distortion. This alteration can take place in three basic ways. First, if the copings are too thin, any binding while it is being seated on the abutment will cause deformity. Second, when the overlay of gold is cast to the coping, the shrinkage of the molten gold can distort the coping. Last, the hot gold can melt a thin spot of the coping and "blast through," causing a fine lining of gold inside the coping.

Coping Waxup • To provide sufficient bulk, full crown copings are waxed up with a 45 degree gingival bevel to form a shoulder 1.5 mm. from the margin and approximately 1 mm. wide (Fig. 1). The wax is not less than 0.5 mm. thick in the remainder of the coping; removal buttons are placed near gingival aspect.

Veneer Copings • Copings for veneer crowns are waxed up in a similar manner except for the labial surface and shoulder. These areas are reduced to the normal dimensions of a routine one piece casting. At the midline of the interproximal surface the high lingual shoulder (1.5 mm.) drops vertically at a right angle to meet the thin labial shoulder (Fig. 2). Retention for the acrylic resin is provided during the fabrication of the coping rather than in the waxup of the overlay. In this manner vital retention at the gingival area can be obtained which tends to inhibit gingival staining of the facing.

Retention • A small piece of fine crinoline gauze is cut to fit the entire labial surface with excess at the incisal-proximal aspect. It is luted to the waxed-up coping at the gingival and incisal areas (Fig. 3). The interproximal winglike overextensions remain unattached. (These can later be bent to the desired shape.) The gauze stands away from the coping very slightly except in the attached areas.

Sprues • A 12 gauge sprue is attached to the occlusal aspect, and 20-gauge accessory sprues are added to the labial and lingual shoulders (Fig. 4). The waxup is invested in any of the high heat crystobalite investments; when set, the ring is placed in a 900°F. oven for one hour. The temperature is raised rapidly to 1,300° and maintained for 20 minutes; the coping is cast with a type C crown and bridge gold. In order to cast the fine labial meshwork, a high heat investment must be used.

Treatment of Casting • No special treatment is required at this time; the margins are finished to the die as usual.

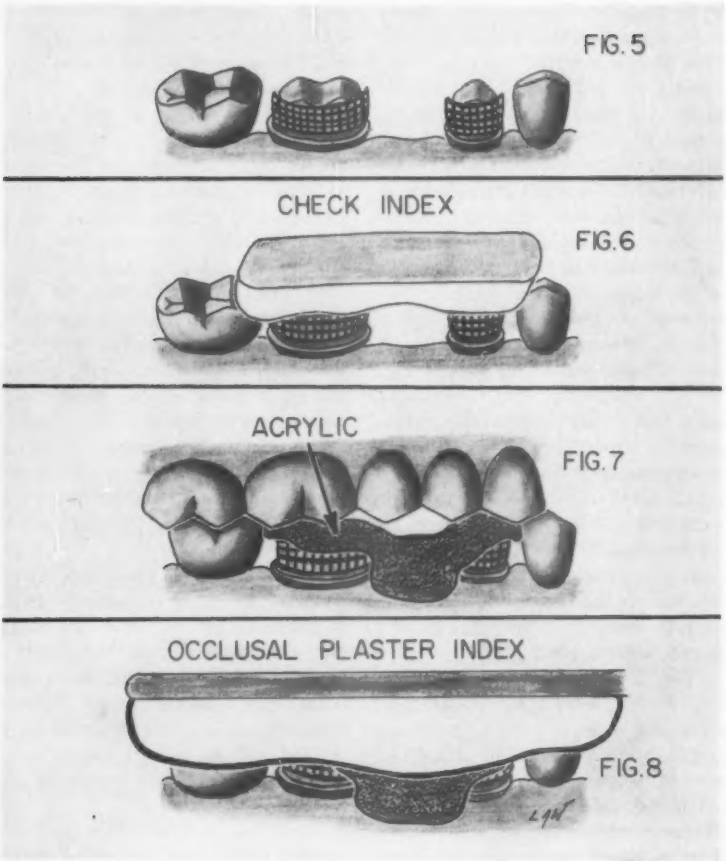
INTRAORAL RECORDS

Occlusal Check Index • The copings are seated on the abutments and checked for occlusal clearance and marginal fit (Fig. 5). A plaster occlusal "check index" is taken with the copings in position (Fig. 6). This is filed for checking the accuracy of the assembled cast.

Centric Relation • When necessary, the occlusion is equilibrated before restorative procedures are initiated so that centric relation and centric occlusion are identical at the vertical dimension of occlusion. However, clinical judgment may sometimes indicate the maintenance of the patient's acquired centric occlusion when the restoration is small in scope and the periodontium in good health. Periodontal disease or a discrepancy of more than 0.5 mm. between centric relation and centric occlusion usually requires occlusal correction to establish harmony. Once this position is obtained it should be guarded judiciously, particularly with full mouth reconstruction.

The vast majority of dental restorative work is fabricated on a hinge articulator without the aid of a face-bow mounting. Any change in vertical dimension in this case can produce gross anteroposterior mandibular displacement.[8] When there is no change in vertical dimension (caused by the centric record itself) this inaccuracy can be avoided even with arbitrary mounting.

Centric Relation Record • Self-curing acrylic resin (Duralay) is painted over the dried gold copings. The opposing teeth are lubricated and the patient closes into the corrected centric occlusion; a small imprint of the opposing teeth is made in the resin (Fig. 7). Broad areas of contact with the opposing teeth should be avoided. After the initial set a small amount of resin is again painted over the occlusal surface and the patient asked to close. This accommodates for the linear shrinkage of a relatively large bulk of resin. The centric relation can be transferred to any articulator merely by constructing two full mouth casts and mounting them together by hand.



Figures 5-8 • Intraoral records. 5: Copings seated on abutments to be checked for occlusal clearance and marginal fit. 6: Plaster occlusal check index taken with copings in position. 7: Centric relation record taken with aid of self-curing acrylic resin painted over dried gold copings. 8: Plaster occlusal index

The contact areas of the adjacent teeth are painted with resin and joined to the abutment copings. Care should be taken to prevent the resin from running into the proximal undercut. If necessary, this can be blocked out by the use of a small piece of wax. The fracture of a plaster impression most often takes place in this critical area. The soft tissue contour is obtained by painting on a layer of acrylic resin (Duralay). The gold copings, soft tissue area, adjacent contact points, and the centric relation record are now embodied in one piece of resin.

Face-bow Mounting • A face-bow mounting and eccentric wax bites are necessary for mounting the case on an adjustable articulator.[9]

Full Mouth Reconstruction • In full mouth reconstruction some provision

should be made to maintain the corrected centric occlusion with accuracy. One way to accomplish this is to construct bilateral posterior temporary gold crowns. The remaining abutments are prepared and copings fabricated. All the copings are placed on the abutments except the two posterior temporary gold crowns. Acrylic resin is painted on the occlusal surface of the copings, as outlined, and the patient closes into the corrected centric occlusion. When the resin hardens, the posterior temporary gold crowns are removed and the respective copings seated. Acrylic resin is painted on each of these copings, completing the exact transfer of the original corrected centric occlusion.

Plaster Occlusal Index • A full mouth plaster occlusal index is obtained (Fig. 8). The buccal and lingual undercuts of the remaining teeth are not engaged, which allows the plaster impression to be removed in one piece. A registration of the opposite arch is taken in alginate; care must be used to prevent bubbles.

CAST CONSTRUCTION

The occlusal part of this impression is poured immediately in die stone; the balance is completed in regular cast stone. On the working model Plasticine is used to box in the copings and the pontic region. The inside of each coping is lubricated with oil before low fusing metal is poured into the area. Paper clips are heated and inserted into the low fusing metal for retention. The Plasticine is removed and the model completed in cast stone. Separation of the resin from the copings will not take place when the plaster is removed because it is imbedded in the gold mesh retention of the copings.

MOUNTING THE CAST

The maxillary cast is oriented with the aid of a face-bow mounting on an adjustable articulator. All occlusal imperfections in the casts should be removed and the casts articulated by hand. The accuracy of the centric relation will be immediately apparent by the absence of rocking and the articulation of the casts themselves. The mandibular cast is then attached to the articulator. Eccentric records provide the condylar inclinations.

CAST ACCURACY

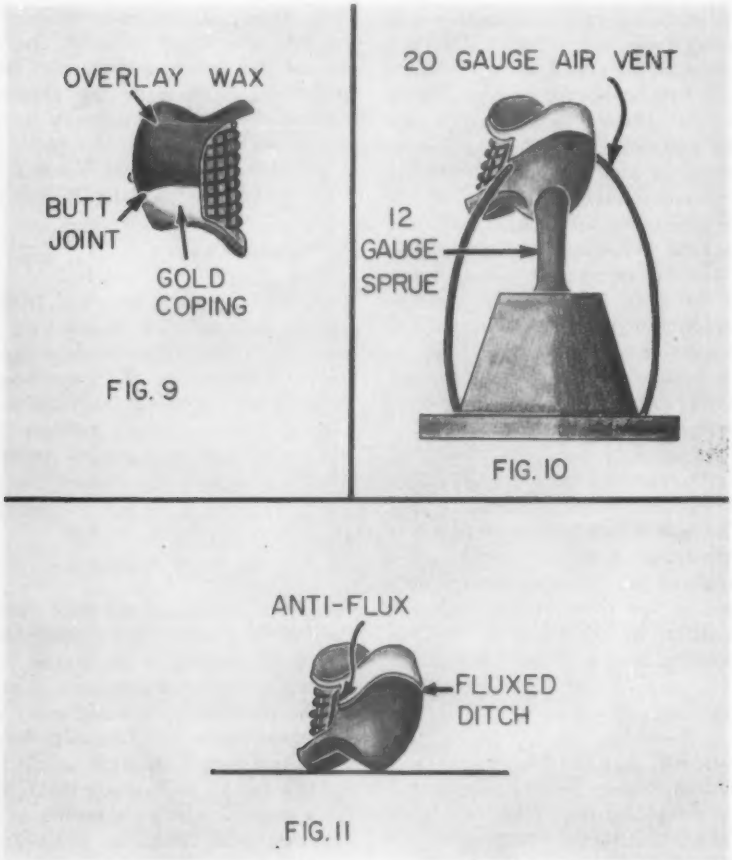
The acrylic resin is removed from the copings by passing it through an open flame. To verify the accuracy of the cast, the check index (Fig. 6), which was previously filed, is trimmed free from contact with the adjacent teeth and soft tissue and cut in half mesiodistally. When the index is placed on the copings, the accuracy of the procedure will be verified.

CASTING METAL TO METAL

Sulfides and oxides of the trace metals in the gold alloy prevent the complete bonding of the overlay to the coping.[10] The use of high carbon investments, even gold plating the coping, does not insure a fusion of the two metals. Clinically the seam of the two metals will stain rapidly when exposed to the oral environment. When the overlay is cast to a coping of non-oxidizing gold, (such as Ney's Zephyr Gold), a near perfect margin is produced. This is contraindicated because the pure gold coping is too soft for crown and bridge purposes. To prevent gingival staining of the seam between the two crown and bridge metals it is absolutely essential to solder this "joint."

WAXUP OF THE OVERLAY

The overlay is waxed up on a suitable adjustable articulator for centric and eccentric occlusal harmony consistent with the condylar and incisal guidances.[2,11-13] A thin layer of Duralay is painted on the (pickled) clean surface of the gold coping to prevent the waxup from chipping off.



Figures 9-11 • Waxup of overlay; spruing; and soldering overlay and coping seam. 9: Lingual wax forms butt joint with shoulder of coping. 10: Main sprue attached to linguo-occlusal slope, with 20 gauge air vents added to each labiogingival corner. 11: Antiflux applied; with paste flux spread along lingual ditch

The lingual wax forms a butt joint with the shoulder of the coping (Fig. 9). When cast, this gingival area will be recontoured to promote gingival health.[14] The original coping will form the entire labial surface of the finished veneer.

PONTICS

The pontic is cast with one of the abutments in one piece. This produces no occlusal or tissue problem because the relation of the abutments to each other and the edentulous ridge is reproduced accurately on the cast.

SPRUING

The spruing, investing and casting procedures in the double cast technic are more exacting than in one piece restorations. Indeed the success of the whole

procedure depends on the adherence to certain very simple steps. The molten gold of the overlay (1,900°F.) will strike the heated gold coping (1,150°F.) and cause it to cool faster than with normal casting. To insure a complete and nonporous casting, the spruing follows a definite procedure. The main sprue should not be less than 12 gauge in thickness; it is attached to the linguo-occlusal slope (or incisal edge).

Twenty-gauge air vents are added to each labiogingival corner (Fig. 10). In normal casting procedures the molten gold entering the mold forces the hot gases occupying this space out through the pores of the investment itself. The gold coping within the investment prevents the normal flow of hot gases; unless complete air venting is provided, porosity and gross voids result.

Miscasts are usually due to thin waxups and faulty spruing rather than lowered burnout temperatures. Large restorations require accessory 14 gauge sprues; a good rule of thumb is to provide an accessory 14 gauge sprue when the overlay gold must extend more than 5 mm. over the gold coping or around a sharp curve.

INVESTING

It is essential to use a high carbon investment (such as Steel's Super Investment, Ransom & Randolph Co.) to prevent the formation of oxides and sulfides on the surface of the coping. Proper burnout temperatures and timing prevent intraoral discoloration of the coping itself. Complete bonding is not possible with present investments. There is hope that such an investment will be developed as revived interest in this technic continues; however, at present it is necessary to solder the butt joint between the two metals.

A small inlay ring should never be used because the carbon in the investment burns off more rapidly. A medium-sized ring is also more practical so that four castings can be produced with each investment. In order to limit the oxidation of the copings, the overlay waxups should be placed as close to the center of the ring as possible. A very heavy mix of investment is vibrated into the gold copings and allowed to set. This helps prevent the "blasting through" of the overlay gold inside the coping.

The remainder of the investment is mixed, according to the manufacturer's directions, placed into an asbestos-lined ring, and allowed to bench set for 30 minutes.

BURNOUT

Accurate oven temperature should be checked with one of the "temperature pills." If the burnout temperature is too low, a miscast is probable; when it is too high, the carbon in the investment will burn out preventing good adaptation of the overcast to the coping as well as causing intraoral discoloration of the coping. When the investment has set (30 minutes), the ring is placed into a 900°F. preheated oven for one hour. The temperature is then raised rapidly to 1,150°F. and held for 20 minutes; the casting is made immediately. The whole casting, (that is, coping, overcast and sprues) must be yellow gold in color when removed from the investment before pickling. If either one has a black discoloration, the coping will tarnish in the mouth even if the seam is soldered. This is of vital concern because any coping discoloration at the gingival aspect shows through the acrylic veneer. The casting is checked on the die and finished in the usual manner.

SOLDERING THE OVERLAY AND COPING SEAM

Soldering the overlay and coping seam is the simplest and quickest procedure of the technic. It requires only two minutes to complete, yet most technicians are hesi-

tant about this step. It should be pointed out that the lingual gold coping shoulder was constructed 1.5 mm. in height from the margin of the preparation. There is no danger of the solder's flowing over this area.

The seam between the two metals is ditched with a disk. To prevent solder from flowing into the window area, antiflux is applied; no antiflux is necessary on the margins (Fig. 11). Paste flux is spread along the lingual ditch. The restoration is placed on an asbestos ring with the margins upward and heated. Very high fusing solder (such as Ney's balance line solder, high fusing), is touched to the ditch. The solder spins around the restoration, filling the ditch completely without overflowing into vital areas.

BRIDGE ASSEMBLY

Multiple restorations can be assembled from the original cast when the check index (Fig. 6) verifies the exact seating of the copings as previously discussed. However, when close supervision is not possible, it is advisable to seat the finished castings on the abutments for soldering procedures.

TRY-IN

The assembled bridge should be seated in the mouth and checked for fit, clinically and roentgenographically. Only minor corrections are usually necessary in centric occlusion and eccentric excursions.

DISCUSSION

With the double cast technic, the fit and marginal adaptation of the restoration can be checked before extensive laboratory work has been done. The centric relation transfer is extremely accurate because there is no change in vertical dimension on the articulator. The maxillomandibular relation is obtained without an appliance in the mouth or intraocclusal materials which alter the proprioceptor responses of the patient thus affecting centric relation.[15] Even more important, the record can be taken and checked without the dentist's hands on the patient's mandible.

Before the abutments are prepared, all corrective manipulations and testing of the maxillomandibular relation has been accomplished during the occlusal equilibration phase. Restorative procedures are not initiated until the patient has adapted to the new relation (if there has been considerable change) and the dentist is satisfied with the mandibular position.

SUMMARY

A technic for the double casting of metal to metal has been described. Utilization of this procedure in full coverage produces extremely accurate master casts and centric relation transfer. The restorations produced with this method require a minimum of intraoral adjustment. Several problems associated with the technic have been discussed with a view toward their solution.

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cases and comments

FORMING THE DENTURE FLANGES

By Victor H. Sears, Cairo, Egypt.

All edges of the denture bases should maintain contact with soft tissues to produce a seal against the ingress of air. The posterior palatal seal, sometimes called the "post-dam," is the best understood part of the seal, and will not be discussed here. Of almost equal importance are the buccal, labial, and lingual flanges now to be considered. These vertical extensions contribute greatly to the retention of the bases if formed properly.

Upper Labial Flange • The upper labial flange should extend vertically to the height of the vestibule. This height is learned by pulling the upper lip forward and noting the line where the soft tissues are attached. Too much thickness here is to be avoided. A thick labial flange may occasionally improve the retention of the base, but it also makes the upper lip bulge. When this thickness is great enough to be noticed from the outside, it produces an unnatural appearance known as "denture face." Even with appropriate teeth, any great thickness over the four incisors gives the face an unnatural appearance. Over the cuspids, however, the flange sometimes needs to be thickened to fill out the corners of the mouth.

Upper Buccal Flanges • In impression making, the upper buccal flanges should be extended both vertically and horizontally to fill the vestibule completely over the bicuspids and first molars without placing the soft tissues under tension.

The height of the vestibule is learned by pulling the cheek horizontally sideways to discover the line of attachment of the soft tissues. When this line is discovered, it should be marked as the limit beyond which the flange should not extend.

The width of the vestibule is learned by grasping the soft tissues with thumb and finger at the corner of the patient's mouth and pulling them straight forward. The operator can then see the space between the ridge and the cheek. This space indicates the required thickness of the flange.

From the esthetic standpoint it is sometimes as important to make the buccal part of the flange thick as it is to make the labial part thin. If the cheeks and the corners of the mouth have become sunken, the facial appearance can be improved by building here a greater thickness than that indicated by the width of the vestibule. The added bulk here often is necessary to restore the facial fullness. At the same time it is important not to extend the flange vertically so far as to put the soft tissues under such tension as might unseat the denture.

Lower Labial Flange • The lower labial flange should extend vertically to the deepest part or almost the deepest part of the vestibule. Too great vertical extension allows the lower lip to exert upward pressure on the denture base. The flange should be thin here, both for esthetic and mechanical reasons.

Lower Buccal Flanges • In the cuspid and first bicuspid regions the lower buccal flange extensions should be determined in much the same way as with the upper buccal flanges, but the anterior part of the lower flange should be thin as far back as the bicuspid region.

Beginning about the second bicuspid region and including the first and usually the second molar regions, the buccal flanges should be made thicker. Then in the third molar regions the flange should be shorter and usually thinner.

The average lower denture is not extended posteriorly as far as it should be over the ridge

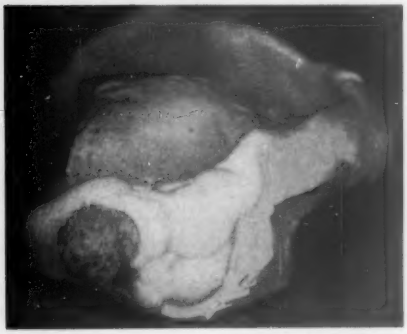

Fig. 1 • In left lateral position of the mandible the right ramus pressed through the softened testing wax and against the impression. Where the darker area of the impression is thus exposed, the flange should be thinned

portion, and when long enough over the ridge it is too long at the distobuccal corner. In impression making it is important to extend the tray well back on the ridge, but to make sure that it does not displace the yielding tissues at the distobuccal corners.

Lingual Flanges • The lingual flange is developed differently. The object is to extend the flange vertically to the floor of the mouth but not lower than this. Of course the floor of the mouth raises and lowers in function, so the flange should not be extended to the lowest position assumed during rest. Too much downward extension results in lifting the denture or causing soreness to the lingual tissues during speaking and eating.

With the patient's mouth half-way open and with the tongue lifted, the height of attachment of the lingual tissues is seen. The flange should not extend lower than the tissue attachment.

Not only should the flange extend just to the lingual attachments of the soft tissues, but it should extend horizontally over the floor of the mouth to cover the sublingual crescent. This crescent-shaped area varies considerably in different mouths, being practically nonexistent in some instances. It is broadest just behind the incisors and tapers off in the bicuspid regions.

Posterior to the sublingual crescent in the bicuspid and molar regions the flange should be extended as low as possible without being lifted when the tongue is made to touch the anterior part of the upper ridge and move from right to left corners of the mouth.

The lingual flanges should be thin in the molar regions, but the flanges of the impression tray cannot well be as thin as those of the completed denture. These flanges on the impression tray should stand somewhat away from the tissues to avoid any possible pressure here, and they should be thick enough to give good support to the impression material. In these regions only, the thickness of the impression is not intended to fix the thickness of the completed denture flanges.

With the flanges of the impression trays formed to assure suitable height and thickness of the denture flanges, the impressions are made with freely flowing material in the customary manner. After the impressions are thus made, the contours usually can be improved by molding them at their distobuccal corners.

Molding the Upper Distobuccal Corners • Of all parts of the upper impression, perhaps the posterior end of the flange is most liable to be defective. The extensions into the distobuccal pockets should be tested routinely. In the average denture the base is too short here, sometimes permitting air to enter and break the seal.

When long enough in the distobuccal corner, the base is in many cases too thick. Excessive thickness here causes pain or dislodgement of the denture as the ramus of the mandible presses against the flange during lateral jaw movement. In lateral relation of the mandible the space at the distobuccal pocket of the balancing side is diminished, sometimes so much so that the flange here should be thinned to almost paper thickness.

In attempting to extend the distobuccal cor-

Fig. 2 • Under closing pressure the softened testing wax was displaced, disclosing two areas that should be relieved

ners of the flanges for better retention and still permit lateral mandibular movement without crowding the tissues, the desired result is sometimes difficult to attain with an impression material such as zinc oxide and eugenol which sets all over at the same time. However, after the impression has been made with this material, the flanges can be tested and corrected with suitable thermoplastic materials.

Low-fusing modeling plastic (old terminology "modeling compound") or a special impression wax, such as Adaptol, can be heated and attached first to the right corner of the impression and the impression seated in the patient's mouth. With the plastic material still soft and with the impression in place, the patient is caused to move the mandible to the left side. An excess of material is applied to make sure that the impression will be extended sufficiently.

With movement of the mandible to the left side, the excess softened material at the right side is pushed away where it would otherwise cause difficulty (Fig. 1).

If the previously made impression shows through, the exposed part of the impression should be cut away generously. Then new softened material should be applied and again molded by causing the mandible to move to the left side.

The left distobuccal part of the flange is then molded similarly with the mandible carried to the right side.

Molding the Lower Distobuccal Corners • Enough softened testing material is added to the distobuccal corners of the impression to assure adequate extension, and the patient caused to exert light closing pressure as well as to protrude the mandible to displace any surplus material (Fig. 2).

As with the upper applications of testing material, so also with the lower applications, the suspected areas should be examined after chilling them in the patient's mouth to learn whether the impression shows through. If so, the exposed places should be trimmed generously, more softened testing material added and carried to position for further testing.

Extending and Boxing the Impressions • To preserve the distobuccal contours, it is important to keep the testing material cool and to exercise special care in attaching the wax extensions around these places. Unless chilled, the extensions of testing wax are easily distorted.

Correcting Completed Dentures • This method of testing and modifying the distobuccal parts of the flanges can be used also on completed dentures. After any excessive bulk of denture base material has been discovered and cut away, the places suspected of being deficient can be scraped clean and built up with self-curing acrylic resin. While still soft, this material is molded to proper form in the same manner as suggested with the testing material. Thus, completed dentures which lack retention many times can be made satisfactory.

After the self-curing acrylic material has become set, it should be polished smooth. Finally, it should be cleaned and lacquered to fill the surface pores. Lacquer for this purpose is available in spray cans, or a suitable solution can be made by dissolving a small amount of acrylic powder in chloroform.

Some such technic as this should be employed routinely for testing the denture flanges and, if necessary, molding them. This is especially important at the distobuccal corners. The contouring of these flanges contributes so greatly to the success of dentures that it deserves careful attention.

Faculty of Dentistry, Cairo, Egypt

SUPERNUMERARY BICUSPIDS

By James E. Flynn, D.D.S., Sepulveda, Calif.

Shortly after admission to the hospital as a psychiatric patient, a 27 year old man was given routine prophylaxis and full-mouth roentgenograms were taken. At this time it was noted that his dentition was abnormal. The patient had no complaints, there was no caries present, and existing resorations were satisfactory.

The patient stated that, as far as he knew, none of his family had "extra teeth." Both parents had been edentulous for years, and the only other offspring, a brother, was deceased. The patient said a "crooked tooth" had been removed about five years ago from between the upper right lateral incisor and central incisor.

The unusual feature in this instance, aside from other supernumerary teeth, is the existence of the four right maxillary bicuspids, three of which are erupted and in good alignment. The fourth is impacted.

Veterans Administration Hospital

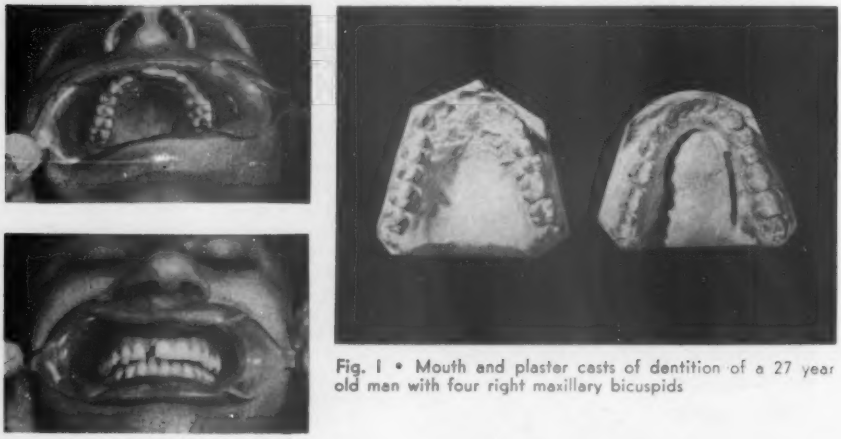

Fig. 1 • Mouth and plaster casts of dentition of a 27 year old man with four right maxillary bicuspids

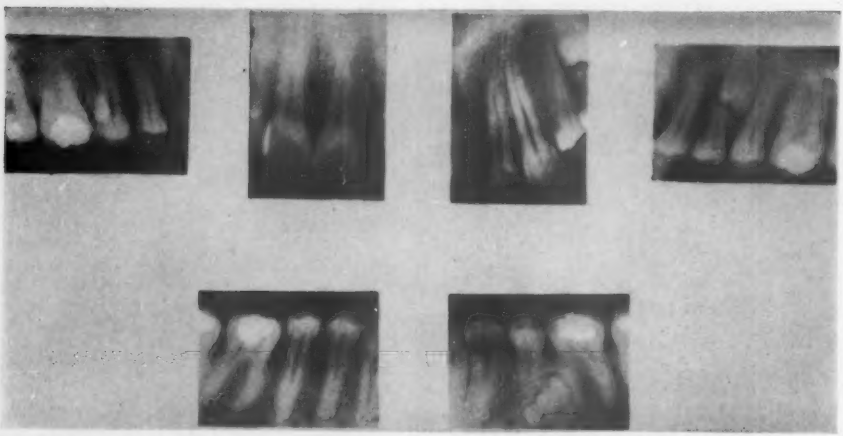

Fig. 2 • Roentgenograms show unerupted maxillary bicuspid in addition to three erupted ones

TRANSPLANTATION: REPORT OF A CASE

By Herbert Goldberg, D.D.S., Philadelphia

The patient, an 18-year-old girl, was referred to our office May 30, 1958 with severe pain in the lower left quadrant. Examination revealed that the second molar was involved and the treatment of choice was extraction.

Roentgenographic examination indicated the presence of a developing lower left third molar. A transplantation was considered and performed at that time.

Method • Using a periosteal elevator the attachment was relieved of the second molar and with a no. 12 scalpel blade a deep incision was made on the crest of the alveolar tissue over the third molar to the distal of the second molar.

The lower second molar was extracted using an Ash molar forceps and the third molar was elevated with a Crier elevator. The socket of the second molar was enlarged slightly with a bone bur, then flushed with warm saline solution to receive the third molar. The third molar, with its apical sac intact, was inserted into the second molar socket.

The patient was instructed to bite gently and continually with one two-inch square sponge placed between the teeth on the left side. This procedure was continued for 12 hours, with the sponge being replaced whenever necessary, and the patient was told to consume liquids only during the first day and soft foods for the the following two days.

Upper left roentgenogram shows second molar to be extracted anad developing third molar in 18 year old patient: upper right, third molar inserted in second molar socket: lower, transplanted molar with complete stability after one year and four months

Normal oral hygiene was continued except that the region involved was not brushed and a mouth wash was used.

After a lapse of three days the patient returned to the office at which time a roentgenogram was taken and some stability was evident. The occlusion was equilibrated using an Airotor while holding the tooth involved to prevent movement. The tissue appeared healthy.

The patient was examined in August, 1959 at which time complete stability was evident with accommodation of the tooth by the patient. During this entire period the patient was cautioned against using undue force in any way toward the tooth involved.

Comment • Examination with attention directed to the adjacent dentition in even the simplest of extraction procedures might enable the dentist to provide a greater service to the patient who has come into the office for a single extraction. *9551 Bustleton Avenue*

BILOBULATED TONGUE

By Otto S. Talle, D.D.S., Los Angeles*

Thoma[1] has recorded the occurrence of congenital anomalies of the tongue such as microglossia, macroglossia, double tongue, lobulated tongue, and fissured tongue. This is an unusual case of a triple tongue observed in the course of a routine dental examination.

The patient was a 33 year old white man hospitalized for a chronic schizophrenic reaction, catatonic type, and who recently had been subject to *grand mal* seizures which were well controlled by medication. None of the patient's relatives could be interviewed on the incidence of familial anomalies, but an investigation of medical examinations in past hospitalizations revealed a congenital anomaly of form in sacralization of the fifth lumbar vertebra with exaggerated development of the transverse processes and their coalescence with the first sacral vertebra.

On examination the tongue revealed a moderate coat consistent with a moderate smoker. Both the filiform and fungiform papillae appeared normal. A deep furrow extended approximately 1 cm. on each side of the midline anteriorly to a point approximately 2 cm. from the tip (Fig. 1). These deep furrows gave the appearance of three tongues within the mouth.

When the tongue was protruded (Fig. 2) the lateral lobes could be lifted and extended laterally. The patient did not have the muscular ability to extend these batlike projec-

Fig. 1. Dorsum of tongue within the oral cavity showing the triple tongue appearance made by the longitudinal grooves

Fig. 3. Patient's tongue drawn from the mouth shows that the lateral lobes do not extend into the posterior third of the tongue area

Fig. 2. Patient's tongue self-extended with lateral lobules held out by applicator sticks. No scar tissues is observable

Fig. 4. Tongue raised showing that there was nothing abnormal about inferior surface

tions himself. However, when the tongue lay in the oral cavity in rest position the wing-like projections automatically folded into the contour shown in Figure 1. When the tongue was pulled from the mouth it could be seen that the lateral lobes did not extend backward to the posterior third of the tongue (Fig. 3).

The inferior surface of the tongue was not remarkable, as is seen in Figure 4. The patient did not complain of pain or discomfort, and stated that his tongue was "no different than anyone else's."

He was discharged from the hospital before the lingual nerve was blocked with anesthesia or tests could be performed for taste sensations of salt, sweet and bitter on the lobules.

Comment • At first it was thought that because the patient was a recent epileptic he had bitten his tongue bilaterally, causing the triple-tongued, bilobulated appearance. As no scar tissue could be palpated and as the appearance of this tongue was not one of a bilateral laceration, it seems that this is a congenital anomaly. Whether any hereditary factor exists is not definitely known as none of the patient's family was examined.

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LOCALIZATION AND REMOVAL OF CHICKEN BONE FROM TONGUE

By Ben H. Haines, D.D.S., Las Cruces, N. M.

A 64 year old white man was referred to the author with the complaint of moderate discomfort in his tongue while talking and eating. The patient and the referring dentist both felt that the discomfort was due to a small splinter of chicken bone deeply embedded in the body of the tongue.

One week prior to the consultation the patient had been eating a chicken pie when a long splinter of bone penetrated the right side of his tongue approximately 2.5 cm. from the tip.

Figure 1

An occlusal roentgenogram, taken at reduced exposure time, revealed a small radiopaque object embedded in the body of the tongue near the right side (Fig. 1). It was decided to remove this foreign body, which was presumed to be the splinter of chicken bone, in the office, under local nerve block anesthesia.

The operation was made somewhat more difficult by tonguetie (ankyloglossia). Since it was impossible to grasp the tongue to pull it forward, a suture was placed through the tongue anterior to the foreign body. The needle was removed from the suture and the two free ends were tied together. An Allis forceps was clamped over the knot and held by the assistant to elevate the tongue. A similar suture was placed posterior to the foreign body, thus stabilizing the operative site (Fig. 2).

A one-half round cutting needle was inserted through the tongue in the region of the foreign body. It was hoped that the object would be included within the tissue which could be elevated by lifting the needle with a needle holder.

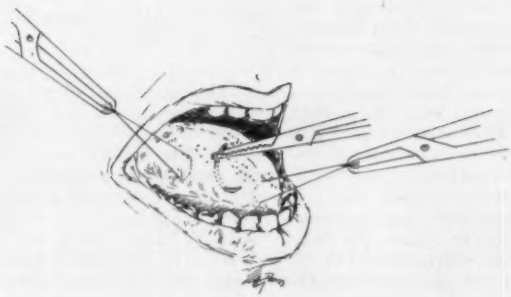

Figure 2

An occlusal roentgenogram was taken to determine the relative position of the chicken bone to the needle (Fig. 3). The bone appeared to be very close to the needle, and it also seemed to be included within the tissue lateral to the needle.

A longitudinal incision was made in the dorsum of the tongue and the tissues were

Figure 3

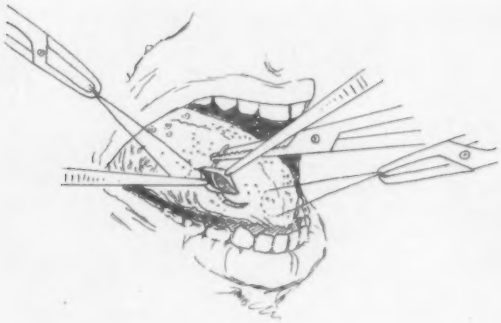

Figure 4

Figure 5

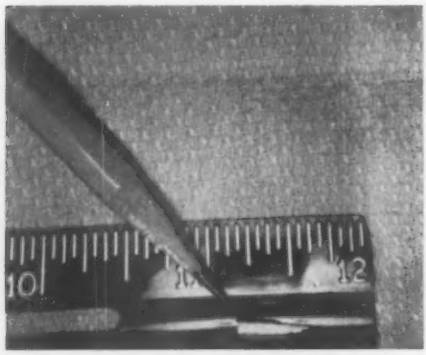

Figure 6

dissected down to the needle (Fig. 4). It was hoped that the incision would reveal the bone with very little dissection, but this was not the case. A radiopaque marker was placed in the incision in such a way that it would contact the needle as it crossed the needle at right angles. This divided the operative region into fourths to indicate in what direction to proceed from the crossed markers.

Another occlusal roentgenogram taken at reduced exposure time revealed that the markers crossed almost directly above the bone (Fig. 5). The dissection was continued in the appropriate quadrant and the bone quickly discovered and removed. The splinter measured 11 mm. in length (Fig. 6).

The incision was closed with two no. 000 surgical silk sutures. A postoperative roentgenogram revealed no remaining bone fragments. The patient received erythromycin in the usual dosage for three days. Cold applications in the form of shaved or chipped ice were held in the mouth frequently during the first day, after which the patient was instructed to hold hot saline solutions in his mouth. Neither postoperative hemorrhage nor edema occurred and healing was uneventful.

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editorials

On the coinage of counterfeit terms

Ambitious practitioners with a commendable desire to bring new technics to professional notice are frequently impelled to coin new terms to designate their innovations. Sometimes these coinages are necessary and advantageous, but the coiner should be careful not to be hasty in adopting a form which sounds well but is constructed without consideration of language principles. When such a thoughtless practice is met, the profession must be made aware of the error. For some time Dr. George B. Denton, of the Bureau of Library and Indexing Service of the Association, has been charged among other things with the duty of detecting such unfortunate usages and of calling them to the attention of the profession. In the following editorial he discusses a glaring instance of this thoughtless coinage and recommends its abandonment before it becomes established in usage:

A recent number of the "prestige" French dental journal *Actualités Odonto-Stomatologiques* has published in translation a series of articles from the *Journal of Prosthetic Dentistry,* in the French version entitled "La Dentogénique." It is surprising that Frenchmen, who are so jealous of the purity of their language and so conscious of the Classic etymology of their terminology, should adopt such a misbegotten coinage as "dentogenic."

This neologism, unfortunately, has appeared not only in the dental literature of America and France but also in Germany in the form "dentogenik" and probably in the writings of dentists in other lands. It is objectionable not because it is a new coinage, but because it does not mean, and cannot mean, what it is intended to convey. The combining form "-gen-" in all sciences—physiology, chemistry, biology —has the one original meaning of "producing" as in such words as *oxygen, hydrogen, hematogenous, homogeneous, autogenous,* and so on. Consequently the term can mean only "producing teeth," which is not the meaning intended.

It is true that there are some old words in the language which etymologically analyzed do not in their elements indicate truly the meaning which they convey—such as *paralysis, melancholy,* and *hysteria.* These are too firmly established in usage by tradition to be changed at this late date for more descriptive terms. But it is a

sound rule of technical language that new coinages should utilize the Latin and Greek stems with strict regard for their implication in modern science. It cannot be expected, to be sure, that a new term will be completely descriptive of its concept, but it is imperative that it should not suggest in its elements ideas wholly unrelated to the concept intended.

The term "dentogenic" has been defended by its creators as being parallel to the recently accepted word "photogenic" in the sense of "being a suitable subject for a picture," "photographing well." When one looks for the parallel in "dentogenic," he discovers at once that there is no analogy. It is the person or object to be photographed that is photogenic. What is it that is dentogenic? Certainly not the patient, not the denture, not the prosthetist!

The general purpose of the so-called "dentogenic" technic, which is not new, has always been called with some appropriateness "characterization of the denture," and might also be designated properly as "personalizing the denture." A recent German author had the good taste to employ the term "physiognomic" which might compete with "dentogenic" in aptness and euphony.

The terms "dentogenic" and "dentogenics" have been barred from the text of articles in THE JOURNAL. Max Filderman, president of the Commission for the Study of Technical Terminology of the French National Academy of Dental Surgery, who has zealously striven to prevent the invasion of incongruous Americanisms into French dental literature, should look into this usage in French and protest against it, not merely because it is a neologism, but because it is a violation of good logic and good sense.

W. D. Workman, syndicated columnist, proponent of fluoridation

The following commentary on fluoridation by W. D. Workman, syndicated by The Hall Syndicate, Inc., is so refreshingly matter-of-fact and contains so much common sense that all dentists might well clip it and call it to the attention of their patients, particularly to their patients with children.

Mr. Workman, whose sagacity has raised him to the ranks of a syndicated columnist, may be expected, therefore, to exercise more than ordinary judgment in writing of matters concerning the public's welfare. In so far as the fluoridation of public water supplies is concerned, he elects to rely on the judgment of the health professions regarding its effectiveness and its safety. If other equally discerning members of the fourth estate would occasionally voice their convictions on this subject to their readers, fluoridation would soon become a routine commonplace procedure in all communities having a public water supply. When that time arrives, which it will, all American kids, including Mr. Workman's kids, will get a better break in safeguarding their teeth.

IT'S THIS WAY

If this doesn't deluge me with hostile letters, nothing will—but I simply can't comprehend all the resistance to controlled fluoridation of water.

In my book, a good set of teeth is something greatly to be desired. I still have most (not all) of my choppers, but like 95 per cent of American adults, I have had my share of tooth trouble—mostly from cavities. Consequently, when somebody tells me that the addition of a little fluoride to the drinking water will reduce the incidence of cavities by about 65 per cent, I listen to what they say.

I listen with especial interest because the people who tell me this are the same professional health guardians who tell me what to do and what not to do about everything else concerning my physical well-being. There are some people in this world we simply have to trust, not necessarily because we love them, but because they know more than we do, and their business is keeping us well.

When my physician (for the American Medical Association) and my dentist (for the American Dental Association) and my public health officer (for the U.S. Public Health Service), all tell me that fluoride in my drinking water will help my teeth without hurting my health, then I'm all for it.

These same scientific types told us years ago that a little chlorine would purify water, that vaccination would stave off smallpox, that pasteurization would safeguard milk, and, more recently, that Salk vaccine would help fight off polio.

Every one of these "new-fangled" ideas encountered some opposition when first proposed, but I'm thankful that these ideas have been adopted. Speaking for me and my family, "I'm happy to roll up my sleeve, hold out my tongue, swallow my medicine, or do whatever else the doctor tells me to do. I think he's on my side."

Some people apparently don't think so. They say this business of adding fluoride to water is a dastardly design to injure the national health, and some folks go so far as to charge that dark Communist motives are behind it. These arguments overlook the obvious facts that many communities already have a much higher proportion of fluoride in their water supplies than ever has been recommended for addition by controlled methods.

Somehow I can't get any more scared of fluoride "poisoning" than I am of the iodine in my table salt, or the oxalic acid in my hot chocolate. If the city fathers put one part per million of fluoride in my water (the recommended amount to inhibit tooth decay), I would have to drink 50 bathtubfuls of the stuff to get a lethal dose. I don't get that thirsty.

The way I look at it, tooth decay is a disease—an unnecessary, unpleasant disease. I may have to put up with my share of it, but if I can get a head start on the rotten business, then I want to do so—and most especially do I want my kids and their kids to get all the breaks they can in safeguarding their teeth.

The medical profession, the dental profession, and the courts of the land stand united in support of water fluoridation. I'm perfectly willing to go along with them.

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Dental societies, dental dealers and dental donations

During the latter part of the nineteenth century when the nation's few and widely scattered dental societies were young and inexperienced, there grew up among them a custom which at the time seemed fitting and proper. It consisted of accepting and occasionally soliciting gifts from dental dealers to be used as prizes at a dental society's affairs. It was a good fellowship custom which established closer rapport between dealer and dentist. It was part of an era. It was akin to the custom which required the family grocer to give a bag of candy to the children when the weekly grocery bill was paid.

As dental societies grew in size and in number they also grew in ethical understanding. In time it became apparent to the more understanding that the acceptance of gratuities was not only burdensome to the dental dealer but embarrassing to the dental society. And so the custom, established in good faith, grew into an annoyance and faded out of existence except in a few isolated instances. Occasionally a dental society is still heard of that has not outgrown the family grocer—bag of candy—something-for-nothing practice.

Now that the profession has reached its present stage of maturity, dental societies should function in a mature manner. The solicitation of gratuities from dental dealers is unprofessional and undignified. It lowers the solicitor and the society in the eyes of those solicited and in the esteem of the community. Each little "bag of candy" request injures dentistry's relations a little with the dental industry and to that extent undermines the legitimate solicitation program of the Fund for Dental Education.

It is as unbecoming as it is unreasonable to ask the dental trade to donate prizes for a dental society's social events. As a matter of basic principle and for the sake of professional pride, dental societies should support such events themselves.

news of dentistry

First National Dental Health Center dedicated in San Francisco

The first National Dental Health Center was dedicated November 6 in San Francisco. Situated on the grounds of the Public Health Service Hospital, it will provide facilities for applied research in the prevention and control of dental diseases and for training dental public health workers in the application of research findings.

During the first year of operation, a staff of 20 has been assigned to the center, including four Public Health Service dental officers who are receiving in-service training. George A. Nevitt is director of the center and its training activities. John C. Greene is head of the epidemiology program.

As the center expands over the next five years, a program of applied research on many phases of dental health will be conducted. Present projects include the investigation of the epidemiology of periodontal disease and a study of factors associated with the occurrence of cleft lip and palate.

As programs develop, the center will offer demonstrations and training courses aimed at furthering the skills, knowledge and information of state and local health agency personnel, dental educators and private practitioners. Studies of problems in dental payment planning and dental education are also planned.

Speaking at the dedication ceremonies, Congressman John E. Fogarty (D.-R.I.), a strong supporter of dental health legislation, said that the "purpose of the center—to narrow the gulf, to reduce the time lag between the discovery and application of knowledge"—was wise and fitting. Many of the projects scheduled by the center, he said, strike at the root of today's dental problems.

President-elect Gerald D. Timmons, representing the American Dental Association at the ceremonies, stated that it was "proper and fitting that public health authorities and the dental profession join together in the fight to conquer a disease which afflicts nearly all of our people and which, necessarily, must be of concern to the entire community. . . . By continued close cooperation and coordinated effort between the public health and the private practitioner, we can bring the day much closer when a generation of Americans will be free from the scourge of oral disease. . . . I wish the program of the dental health center success and I pledge the continuing support and cooperation of the American Dental Association."

John D. Porterfield (at lectern), Deputy Surgeon General of the U.S. Public Health Service, delivers address during dedication of the first National Dental Health Center, November 6, in San Francisco. Seated in the front row on the speakers' platform are, from the left: Gerald D. Timmons, president-elect of the American Dental Association; Congressman John E. Fogarty (D.—R.I.), and Donald J. Galagan, chief of the Public Health Service's Division of Dental Public Health and Resources.

Association Affairs

COUNCIL ON CARE OF AGED TO MEET DECEMBER 15-16

The Joint Council to Improve the Health Care of the Aged will hold its second national conference on problems of the aged, December 15-16 at the Edgewater Beach Hotel in Chicago. More than 500 persons are expected to attend. Charles H. Patton, immediate past president of the American Dental Association, who is chairman of the Joint Council, will preside.

The economic, social and health status of the aged will be examined by representatives from industry, labor, government, civic and religious groups as well as from the four member organizations of the Joint Commission: American Medical Association, American Nursing Home Association, American Hospital Association and American Dental Association.

Among the featured speakers will be Sam Jaffe, stage and screen actor who is currently appearing in the part of Dr. David Zorba in the TV series, "Ben Casey"; John G. Myers, Ph.D., economics professor from the University of Colorado, and Robert H. Dovenmuehle, M.D., research coordinator at Duke University's Center for the Study of the Aging.

Conference discussions will center about three major panels entitled: Dollars and patterns—paying for health care programs; planning and doing—reports of successful state and local programs; advances in research—reports of scientific developments and new treatment technics.

1962 DENTAL HEALTH WEEK WINDOW DISPLAYS AVAILABLE

Full-color window displays publicizing National Children's Dental Health Week now are available from the Association.

The displays, which are single sheets 36 by 50 inches, can be glued or taped to windows or tacked to backboards. This is the first year such displays have been distributed.

The illustration on the display is the same used on the dental health week poster—a man, woman and child, each with a toothbrush. The slogan for the week which will be observed February 4-10, is: "A smile is to keep—with good dental health."

Prices are: (1 to 9 displays) 50 cents each; (10 to 24) 45 cents each; (25 to 99) 40 cents each; (100 or more) 35 cents each. Orders should be sent to the Order Department, American Dental Association, 222 E. Superior St., Chicago 11.

THREE PAMPHLETS AVAILABLE FROM BUREAU OF STATISTICS

Three pamphlets are now available from the Bureau of Economic Research and Statistics. They are composite reprints of articles that appeared serially in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. The pamphlets are: *Survey of hospital dental departments, Survey of public attitudes regarding dentures,* and *Survey of dental laboratory industry.* Single copies may be obtained without charge from the Bureau at the Central Office, 222 E. Superior St., Chicago 11.

PEDERSEN ACCEPTS CALLAHAN MEDAL, ADDRESSES ADA STAFF

Professor P. O. Pedersen, dean, Royal Dental College of Copenhagen, received the 1961 Callahan Memorial Award Medal at the Ohio State Dental Association meeting, November 5-8 in Columbus. He is the thirty-ninth recipient chosen for outstanding contributions to dental service.

While in the United States, Professor Pedersen also delivered several lectures. He spoke to the staff of the American Dental Association November 8 at the Central Office in Chicago and showed slides and a movie which he had made several years ago in Greenland.

On November 9, he delivered an address at an observance of the twenty-fifth anniversary of the Walter G. Zoller Dental Clinic of the University of Chicago. He spoke on the current international scene in dental research.

COUNCIL ON LEGISLATION TO MEET DECEMBER 17-18

The Association's Council on Legislation will meet December 17-18 at the Central Office in Chicago. The Council will discuss legislation involving grants-in-aid for state dental public health activities, health care for the aged, fiscal 1963 appropriations for the division of dental public health and resources and for the National Institute of Dental Research, retirement programs for the self-employed, state dental practice acts, Armed Forces dental services, federal aid to education, and enabling acts for dental service corporations.

Professor P. O. Pedersen (r.), dean of the Royal Dental College of Copenhagen, receives the 1961 Callahan Award from Wendell D. Postle, dean of the College of Dentistry at Ohio State University. Professor Pedersen also delivered several lectures while in the United States, including one to the staff of the American Dental Association.

DENTAL JOURNALISM MEETING OCTOBER 14 IN PHILADELPHIA

A conference on dental journalism was held October 14 in Philadelphia by the American Association of Dental Editors and the Council on Journalism of the American Dental Association.

The American Association of Dental Editors presented its William J. Gies 1960 Editorial Award to Norman C. Colebrook, former associate editor of the *Ohio Dental Journal,* for his editorial "Dentistry needs more carrots," which appeared March 1960 in the *Ohio Dental Journal.* The group also presented its Distinguished Service Award to Jacob A. Salzmann. Dr. Salzmann is an editor of the *American Journal of Orthodontics,* has written several books on orthodontics and public health dentistry, and was the editor of the *New York Journal of Dentistry* for over 20 years.

Honorary memberships in the American Association of Dental Editors were presented to Mrs. Velma M. Child, secretary of the Council on Journalism of the American Dental Association, and Mr. John J. Hollister, director of the department of Advertising and Exhibits of the American Dental Association.

At the meeting, the following new officers were elected by the American Association of Dental Editors: President, J. C. A. Harding, San Diego; president-elect, Sidney Epstein, San Francisco; secretary-treasurer, Elmer Ebert, Chicago; vice-president, L. W. Bimestefer, Dundalk, Md., and editor, Ralph Rosen, St. Louis.

Speakers at the conference included Mr. Ray Cobaugh, business manager of the *Pennsylvania Dental Journal*; Mr. David Taylor, historical novelist and teacher, and Miss Berenice E. Connor, assistant to the editor of *Ladies Home Journal.*

DENTAL HYGIENISTS DISCUSS BOARD WITH ASSOCIATION

Representatives of the nation's dental hygienists met at the Central Office November 13 with the American Dental Association's Council of National Board of Dental Examiners. The conference was held to begin implementation of the Association's House of Delegates action at the recent annual session which provides for a national board examination for dental hygienists.

About 600 hygienists are expected to take the first examination, scheduled tentatively for April. The House action gave the Council the responsibility of providing and conducting written examinations of dental hygienists who seek

Dental students who made the winning presentations in the Student Clinic Program of the American Dental Association's 102nd annual session meet with Mr. Henry Thornton, president of the Dentists' Supply Company, and Association President Charles H. Patton (fourth and fifth from left) to receive their prizes. The students (from the left) are: David L. Turpin, State University of Iowa; Frank E. Weber, University of Louisville; Duane F. Carbone, Harvard School of Dental Medicine; Frank Mellana, Joseph Pianpiano and Edward M. Ras, Columbia University, and Donald J. Aronson, University of Texas. Two students from the University of Alabama, William J. Logothetis, Jr., and Harold E. Pierce, Jr., were unable to be present.

licenses to practice in any state, district or dependency of the United States. Clinical demonstrations are reserved to the boards of the respective states since dental hygiene licensure is subject to state law.

HILLENBRAND CHOSEN OFFICER OF MEDICAL LIBRARY GROUP

Harold Hillenbrand, secretary of the American Dental Association, was elected an honorary vice-president of the Medical Library Association for 1961-62, during the group's recent meeting in Seattle, Wash. Other officers elected were: President, Miss Gertrude Annan, New York Academy of Medicine; vice-president, Dr. Frank B. Rogers, National Library of Medicine; secretary, Miss Ruth J. Mann, Mayo Clinic, and treasurer, Mr. John P. Ische, Louisiana State University.

EXTEND ACCIDENT, HEALTH INSURANCE PLAN COVERAGE

The Board of Trustees, at the recommendation of the Council on Insurance, has approved the addition of an Extended Benefits Plan to the Association's Group Accident and Health Program. Under the new plan, sickness disability benefits may be extended, on an optional basis, from two to seven years and accident disability benefits from five years to life.

The Extended Benefits Plan, which is underwritten by the National Casualty Company of Detroit and administered by M. A. Gesner, Inc., became effective November 1, although the formal enrollment period will not begin until January 1, 1962. All eligible members under age 60 may apply now. Coverage in the Extended Benefits Plan is contingent upon participation in the basic plan and is limited to $400 per month indemnity. Presently uninsured members may apply for both plans simultaneously. Members currently covered in the basic plan for monthly benefits of less than $400 may apply for Extended Benefits up to the amount of their basic coverage. Members carrying basic benefits of $500 or $600 per month are restricted to a maximum of $400 Extended Benefits. Applications for Extended Benefits from presently insured members who are physically impaired will be approved if 75 per cent of all of the members participating in the basic plan apply for the extended coverage. The annual premium for the added benefit is $11 per $100 of monthly indemnity for members under age 50 and slightly more for members between 50 and 60. Full details may be obtained from the Council on Insurance, at the Central Office, or from M. A. Gesner, Inc., at 216 E. Superior St., Chicago.

SEEK EUROPE-BOUND DENTIST AS LECTURER ON ENDODONTICS

The American Dental Association is looking for a dentist who will be in Europe the week of April 23, 1962, and would be willing to lecture on endodontics for one of the European dental societies. Further information may be obtained from Harold Hillenbrand, secretary of the Association, 222 E. Superior St., Chicago 11.

MANY COUNTRIES REPRESENTED AT PHILADELPHIA SESSION

Forty-one foreign countries were represented at the American Dental Association's 102nd annual session in Philadelphia, October 16-19. There were 293 international guests in attendance of whom 247 were dentists, 42 were wives, and 4 were not classified.

DENTAL RESEARCH CONFERENCE HELD NOVEMBER 13-14

The second conference of dental research coordinators and directors sponsored by the Association's Council on Dental Research was held November 13-14 at the Central Office in Chicago.

Work groups discussed the problems of

Meeting with the governor of Puerto Rico, Luis Muñoz Marin (r.), during the annual session of the Puerto Rico Dental Association are, from the left: Mario Ramírez Acosta, president, Colegio de Cirujanos Dentistas; Herman Porrata, president-elect of the Colegio; Paul K. Musselman, Fourth District trustee; Arturo Benavent, president, Puerto Rico Dental Association; John R. Abel, president, American Dental Association. The constituent society's meeting was held in San Juan, October 21-23.

work space, personnel and clinical research. Other topics under consideration were the federal grants program, expansion of dental research activity, training future research workers, and administrative problems in research activities.

DENTISTS DONATE $58,500 TO 1962 RELIEF FUND DRIVE

As of October 31, the 1962 Relief Fund Drive had collected $58,500 of its goal of $125,000. Paul H. Bowden, chairman of the Council on Relief, has congratulated dentists for responding thus far so well to the campaign, but cautioned that there is still a long way to go before the goal is reached. He urged all dentists to send in their contribution and assist their colleagues.

NEW LIST OF PACKAGE LIBRARIES ISSUED BY BUREAU

The Association's Bureau of Library and Indexing Service has prepared a list of dental books published between January 1958 and September 1961, and a list of the package libraries available, together with instructions for the procedure to be followed in ordering any of these.

Members are entitled to borrow any of these books or package libraries as well as any of the current dental journals published in the United States and abroad that can be acquired. There is no charge for borrowing books, but the rental fee of one dollar for each package library (plus 4 per cent Use Tax for Illinois residents) should accompany requests.

The new listing, *Books and Package Libraries for Dentists,* is available free of charge on request to the Bureau at the Central Office.

Dental Research

ADVISORY DENTAL RESEARCH COUNCIL MEMBERS SELECTED

Twelve members and two ex officio members have been appointed to serve on the National Advisory Dental Research Council. The newly-selected members are: Harold L. Enarson, vice-president, University of New Mexico; Willard C. Fleming, dean, University of California College of Dentistry; Russell S. Poor, provost, the J. Hillis Miller Health Center, University of Florida; Mrs. David Wesley Gaiser, Spokane, Wash.; John F. Reed, vice-president, University of New Hampshire; William J. Simon, College of Dentistry, State University of Iowa; Stephen P. Forrest, dean, St. Louis Uni-

versity School of Dentistry; David Weisberger, professor of dental medicine, Harvard School of Dental Medicine; Mr. W. Howard Chase, president, Howard Chase Associates; Jacob J. Longacre, director, Cleft Palate Clinic of the Children's Hospital, Cincinnati, Ohio; Emory W. Morris, president and general director, W. K. Kellogg Foundation; R. Blackwell Smith, president, Medical College of Virginia. Ex officio members are: J. E. Fauber, assistant chief medical director, dental service, Veterans Administration, and Col. Harold E. Dilley, USAF (DC), Washington, D.C.

Members of the council advise and make recommendations to the Surgeon General on research and training grants and fellowships to be awarded from Public Health Service funds appropriated to the National Institute of Dental Research. The Council meets three times a year at the National Institutes of Health.

ST. LOUIS TO HOST DENTAL RESEARCH GROUP IN MARCH

The International Association for Dental Research will hold its fortieth general meeting in St. Louis, at the Sheraton-Jefferson Hotel, March 15-18. About 400 technical papers will be presented, including reports by the Dental Materials Group which will meet concurrently.

The program will include reports on both clinical studies and basic dental research. Sessions will be devoted to oral pathology, anatomy and histology, nutrition, dental caries, microbiology, electron microscopy, pharmacology, histochemistry, saliva and salivary glands, radiobiology, calcification, periodontology, fluoride and enamel solubility, growth and development, physiology, surgery, biochemistry and enzymology, calculus and plaque, pulp studies or oral biology.

Further information may be obtained from S. J. Kreshover, National Institute of Dental Research, National Institute of Health, Bethesda 14, Md.

TO GIVE RESEARCH REPORTS AT ORTHODONTISTS MEETING

The research meeting of the American Association of Orthodontists, April 29-May 3, will consist of ten-minute research reports to be presented orally or read by title only. All persons engaged in orthodontic research or allied fields are invited to participate in the program to be held in Los Angeles.

The 1962 Milo Hellman Prize Essay Contest winners also will be presented during the meeting. Essays competing for this award ($500) must represent an original investigation and contain some new significant material of value to the art and science of orthodontics, and the work must be the contestant's first research orthodontic publication.

The essays must be postmarked not later than January 1.

Further information may be obtained from Faustin N. Weber, 847 Monroe, Memphis 3, Tenn.

National Defense

TIMKE NAMED DENTAL HEAD AT WALTER REED INSTITUTE

Col. George H. Timke, Jr., has been named director of the division of dentistry at Walter Reed Army Institute of Research, succeeding Col. Thomas A. McFall, who has retired.

Prior to his new assignment, Colonel Timke had served as a dental surgeon at headquarters, Military District of Washington. He is a graduate of Northwestern University School of Dentistry and completed one year of graduate training in oral medicine at the University of Pennsylvania.

ARMY TO OBSERVE CHILDREN'S DENTAL HEALTH WEEK

The Army Dental Corps will extend its preventive dentistry program to include the National Children's Dental Health

Week, February 4-10. A circular from the Department of the Army has been sent out, urging military commanders to emphasize the observance of this week at all installations where dependent children are in residence.

National Children's Dental Health Week is being sponsored for the fourteenth consecutive year by the American Dental Association.

Dental Societies

MARYLAND SOCIETY HAS BOOTH AT TEACHERS' CONVENTION

The Council on Dental Health of the Maryland State Dental Association sponsored an exhibit on the teaching of dental facts at the annual Maryland State Teachers Association Convention, October 19-20 in Baltimore. The exhibit was staffed by members of the Maryland Society of Dentistry for Children. More than 18,000 instructors attended the convention.

At the Maryland State Teachers Association Convention, Alvin Greenberg of Baltimore presents material to be used by teachers in promoting the Best Smile Contest, one of the features of National Children's Dental Health Week, to Peggy Pryor, a student teacher from Frederick, Md. Miss Pryor is a senior at the University of Maryland.

Dental Education

WHO PUBLISHES BOOKLET ON WORLD'S DENTAL SCHOOLS

The World Health Organization has published a *World Directory of Dental Schools* consisting of 228 pages, in English and French editions. The publication gives information on dental education in 70 countries, describing the administration, conditions of admission, curriculum content, and examination procedures of the dental schools, and regulations governing licenses to practice.

The *Directory* lists every dental school in each country, giving its name and address, year founded, size of teaching staff, total enrollment, annual admission, number of graduates and annual tuition fees.

The booklet costs $3.50 (clothbound edition, $5) and is distributed in the United States by Columbia University Press, International Documents Service, 2960 Broadway, New York 27.

PHYSICIANS AND SURGEONS TO BUILD NEW DENTAL SCHOOL

The College of Physicians and Surgeons of San Francisco has announced plans for a $5,000,000 building to house the School of Dentistry. The new building will be located in the Presbyterian Medical Center with which the college recently affiliated. The land for the building site has been acquired and the construction program is expected to be completed by January 1964.

INDIANA HOLDS WORKSHOP ON ADHESIVE MATERIALS

A workshop on adhesive restorative dental materials was held September 28-29 at Indiana University in Indianapolis. The workshop was sponsored by a grant

Participating in a workshop on adhesive restorative dental materials held recently at Indiana University were, from the left: Francis A. Arnold, Jr., director, National Institute of Dental Research; Mark Conner, executive secretary, Dental Study Section; Prof. Ralph W. Phillips, chairman of workshop, Indiana University School of Dentistry; Gunnar Ryge, co-chairman of workshop, Marquette University School of Dentistry; and Robert Kreiner, chairman, Council on Dental Research, American Dental Association.

from the National Institute of Dental Research. Twenty-eight participants discussed tooth structure, principles of adsorption and adhesion in an aqueous environment, and materials and test methods. Observers from the Public Health Service, the Armed Forces, and from the Council on Dental Research of the American Dental Association also were present.

Several specific recommendations were made by the workshop in regard to the direction which future research should take.

1. Information is needed regarding apatite chemistry, the mechanism of recrystallization and formation of secondary dentin.

2. Future research must include studies on how to wet a tooth surface and maintain that wetting.

3. As the greatest possibilities lay in bonding to the inorganic structure of the tooth, future work should be beamed in this direction.

4. There is a need for the development of better and standardized test procedures for assessing adhesion.

The entire proceedings of the workshop were transcribed and will be published. Copies may be obtained from the chairman of the workshop, Prof. Ralph W. Phillips, Indiana University School of Dentistry, or from the co-chairman, Gunnar Ryge, Marquette University School of Dentistry. Copies will be sent to all dental schools.

CASUALTY TREATMENT COURSES SET FOR FEBRUARY, MARCH

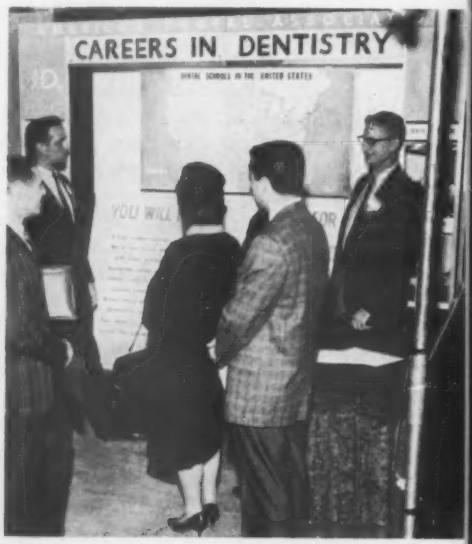
Two spaces have been reserved for members of the American Dental Association to attend the casualty treatment training courses to be presented by the Navy Dental Corps at the U.S. Naval Training Center, San Diego, on February 12-16 and March 12-16. Members wishing to register for either of these courses should contact the Secretary of the Council on Federal Dental Services at the Association's Central Office.

MICHIGAN HAS TWO MOTT FELLOWSHIPS AVAILABLE

Two fellowships in graduate dentistry for children at the University of Michigan have been made available by the Charles Stewart Mott Foundation of Flint, Mich. Each fellowship provides for 17 months of formal graduate study at the university's W. K. Kellogg Foundation Institute of Graduate and Postgraduate Dentistry (September 10, 1962, to January 31, 1964). Tuition is paid for the three semesters and an intervening session of summer school. A stipend of $150 a month also is provided. After the formal instruction, the candidate reports to the

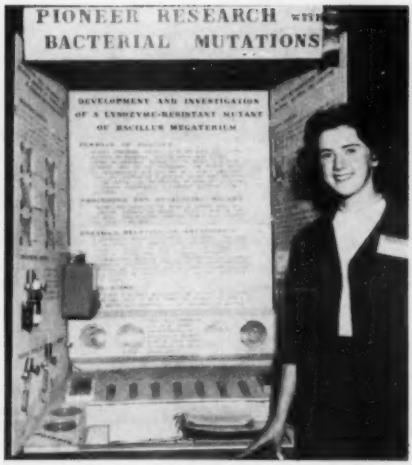
This view shows part of Philadelphia's Convention Hall where 328 commercial exhibits were presented during the American Dental Association's 102nd annual session, October 16-19. In addition, there were more than 350 scientific presentations—clinics, films, exhibits and lectures—held in the Hall.

Convention Hall
Philadelphia
October 16-19



Part of a group of selected Philadelphia high school students who were honored by the Association during a Career Day Program during the annual session, examine the Association's exhibit on Careers in Dentistry. The Career Day Program also included visits to the House of Delegates and the dental schools of Temple University and the University of Pennsylvania.

Shown listening to an explanation of treatment of the oral-facial handicapped at the scientific exhibit of the Lancaster Cleft Palate Clinic are two of the many annual session participants.



The two girls who won the dental competition in the National Science Fair Program received as their prize trips to the Association's annual session and the presentation of their projects in Convention Hall among the scientific exhibits. The winners were (above) Miss Barbara E. Parker of Detroit and (left) Miss Ann E. Stuart of Camp Hill, Pa.

Part of the more than 16,700 participants are shown registering for the annual session. The final registration figure of 16,701 was the second largest ever recorded for a normal annual session.

Mott Foundation's Children's Dental Clinic for a year of experience, with a stipend of $4,400.

Qualifications for the fellowships include an interest in pedodontics, acceptance to the School of Graduate Studies of the University of Michigan (usually requires an average of "B" in undergraduate grades), and a license to practice in the United States.

Further information may be obtained from Kenneth A. Easlick, professor of dentistry, University of Michigan School of Dentistry, Ann Arbor.

SIMON RESIGNS AS DEAN OF IOWA DENTAL SCHOOL

William J. Simon, dean of the College of Dentistry at the State University of Iowa for eight years, has resigned. George S. Easton, former assistant dean, has been appointed acting dean.

Dr. Simon received his dental and Master's degrees from the University of Minnesota and was head of operative dentistry there before becoming dean at Iowa in 1953. While at Iowa he instituted a research program by faculty members and graduate students.

DENTAL SCHOOLS TO TEACH TREATMENT OF AGED PATIENTS

Eleven dental schools will cooperate with the Public Health Service in the initial year of a four-year program designed to teach dental students to treat handicapped, chronically ill, and aged patients.

Sponsored by the Division of Dental Public Health and Resources, U.S.P.H.S., the program inaugurates a major effort to prepare undergraduate dental students to meet the treatment needs of people whose physical conditions either preclude their going to the dental office for treatment or demand the use of specialized treatment procedures.

Supported by matching funds from the dental schools and the U.S. Public Health Service, the projects will permit dental schools to experiment with methods for teaching students to handle the dental problems of these special groups. Technics of care in the home, in institutions, and in the dental office will be developed or improved. Ultimately, the schools' experiences should provide data and knowledge necessary for the development of dental public health programs for special groups.

The schools that are participating in the program are: University of Pennsylvania, University of Tennessee, Tufts University, Loyola University, University of Washington, Fairleigh Dickinson University, Northwestern University, New York University, West Virginia University, University of Pittsburgh, University of Alabama.

Selection of the dental schools was based on: Completion of a survey of the chronically ill and aging population by state or local dental societies or by state health departments; the known interest of the school and its faculty in the problem, and the geographic location of the school.

APPLEGATE ASSISTANT DENTAL DEAN AT DETROIT UNIVERSITY

Stephen G. Applegate, professor of prosthetic dentistry at the University of Detroit Dental School since 1940, has been named assistant dean of the school. Dr. Applegate, a graduate of the University of Michigan School of Dentistry, joined the dental faculty of Detroit in 1934. He is a member of the American Denture Society, the Academy of Denture Prosthetics, Omicron Kappa Upsilon, Delta Sigma Delta, a Fellow of the American College of Dentists, and a past president of the Detroit Dental Clinic Club.

SCHOOLS SCHEDULE GRADUATE COURSES, REVIEW PROGRAMS

Alabama • The University of Alabama School of Dentistry is offering the following refresher

courses: Restorative dentistry, March 2-4, John Mosteller and William D. Powell, $100; malocclusion, its detection, moderation and interception, April 7-9, Faustin Weber and John Rumble, $100; advanced periodontic procedures, April 14-15, Clifford Ochsenbein, $100; immediate endodontic therapy followed by periapical surgery, April 25-27, Adeeb E. Thomas, $100; use of the edgewise appliance in adult orthodontics, May 12-14, Marvin C. Goldstein, $100; and anatomy of the head and neck, May 21-23, Harry Sicher, $100. Further information may be obtained from the director of the refresher course program at the school, 1919 Seventh Ave., Birmingham, Ala.

Armed Forces • The Armed Forces Institute of Pathology will present a course, pathology of the oral regions, March 12-16, which will be open to civilians as well as military personnel. Lecturers will include Donald A. Kerr and Robert J. Gorlin. There is no fee. Members of federal services who wish to attend under orders should apply through appropriate military channels. Civilians may apply to the Director, Armed Forces Institute of Pathology, Washington 25, D. C. Applications should be submitted at least two months in advance of the course.

California • The University of California School of Dentistry is offering the following courses: Oral surgery for the general practitioner, December 1-2, Robert B. Shira; and the dentist-hygienist team approach in gingival disease, December 9, Perry A. Ratcliff and staff. Further information may be obtained from Marilyn Johnson, administrative assistant of postgraduate education at the school, San Francisco Medical Center, San Francisco 22.

Chicago • The Academy of Dentistry for the Handicapped is offering a postgraduate course, February 18, at the Conrad Hilton Hotel in Chicago, on the treatment of the adult handicapped in the dental office. Lecturers will include Edward E. Gordon, Julius H. Bolgla, and Robert I. Kaplan. Four hours credit will be given by the Academy of General Dentistry to members taking the course. Further information may be obtained from Robert Holle, 3501 Cornell Place, Cincinnati, Ohio.

Illinois • The University of Illinois College of Dentistry is accepting applications for two and three year full-time courses in oral surgery beginning July, 1962. Both programs carry credit toward a master of science degree. Further information can be obtained from Daniel M. Laskin, department of oral and maxillofacial surgery at the school, 808 S. Wood St., Chicago 12.

The school is also offering several postgraduate courses, which are: General anesthesia and premedication for dentists, December 11-15, Elaine Stuebner and staff, $100; periodontics, January 10 for 4 Wednesdays, Charles G. Maurice and staff, $100; diet and nutrition in dental practice, January 10 for 5 Wednesdays, Samuel Dreizen, $50; histophysiology for the general practitioner, February 15-16, Verda E. James and staff, $50; evaluation and review of medical problems in dentistry, February 17, Elaine Stuebner and staff, $25; practice management, February 17, Arthur J. Skupa and staff, $25; radiographic evaluation of bone in oral diagnosis, February 17, Seymour Yale and staff, $25; pedodontics, March 19-23, Thomas K. Barber and staff, $100; endodontics, May 2 and 9, Robert Kesel and staff, $50; dental materials, June 6, Ralph Phillips, $25. Further information on these courses may be obtained from the division of postgraduate education at the school.

Iowa • The department of pedodontics and preventive dentistry, College of Dentistry, State University of Iowa, now offers graduate training in conjunction with the graduate college, leading to the degree of Master of Science in Pedodontics. A certificate program in this department also is available. Ordinarily, applicants are selected in June and September. Further information may be obtained from the head of the department at the college, Iowa City, Iowa.

Jewish Chronic Disease Hospital • A prosthodontic residency is available at the Jewish Chronic Disease Hospital for graduate dentists with one year of internship, beginning July 1, 1962. Full maintenance and a stipend of $200 per month is provided. Further information may be obtained from the director of dentistry at the hospital, 86 E. 49 St., Brooklyn 3, N.Y.

Joint Diseases Hospital • The Hospital for Joint Diseases has available a rotating dental internship for the year beginning July 1, 1962. The training includes oral surgery, orthodontics, oral pathology, roentgenology and periodontics. Further information may be obtained from the executive director of the hospital, 1919 Madison Ave., New York 35.

Kentucky • The University of Kentucky College of Dentistry will offer two postgraduate courses during the first half of 1962. They are: Practice administration, February 5-6, Cecil

H. Bliss, and endodontics for the general practitioner, May 10-11, John I. Ingle. Further information may be obtained from Stephen F. Dachi, director of postgraduate education at the school, Lexington, Ky.

King County Hospital • A residency is available in oral surgery starting July 1, 1962 at the King County Hospital System. Training includes oral surgery, general anesthesia, radiology, and pathology. The residency is supervised by the University of Washington oral surgery department. Further information may be obtained from the oral surgery service at the hospital, 325 Ninth Ave., Seattle, Wash.

Michael Reese Hospital • Michael Reese Hospital and Medical Center will present a course, the medical laboratory in clinical dentistry, February 22-23, by Emanuel Cheraskin. The fee is $50. A printed textbook, *Diagnostic Stomatology*, by Dr. Cheraskin will be supplied with the course. Further information can be obtained from the dental department of the hospital, 29th St. and Ellis Ave., Chicago 16.

Michigan • The graduate and postgraduate dentistry division of the University of Michigan is offering the following courses: Complete denture prosthesis, January 8-19; occlusal equilibration, January 22-26; partial denture prosthesis, January 29-February 9; occlusal equilibration, February 5-9; hydrocolloid and rubber base inlay technics, February 12-14; application of theoretical mechanics to orthodontics, February 19-21; guiding occlusal development—a course in interceptive orthodontics for the general practitioner, February 26-March 9; clinical dental hygiene (for dental hygienists), February 28-March 2; gold inlay restoration, March 2-9; endodontics, March 5-16; minor oral surgery, March 5-16; occlusal adjustment and retention problems in orthodontic treatment, March 12-14; control of apprehension and pain in dentistry for children—a course for the family dentist, March 26-27; anterior gold foil restoration, March 26-28; and dental practice administration, March 26-30. Further information may be obtained from William R. Mann, associate director of the W. K. Kellogg Foundation Institute at the school, Ann Arbor, Mich.

Minnesota • The University of Minnesota School of Dentistry is offering several courses for the coming year. They are: Endodontics, November 6-8, May 7-9, J. R. Jensen, $30; periodontology, December 7-9 and January 6, E. M. Schaffer, $50; radiographic interpretation, December 4, E. E. Petersen, $10; hospital dentistry, January 16-18, N. O. Holte, $45; dentistry for children, March 14-16, H. C. Wittich, $30; high speed instrumentation and indirect impression technics for multiple restorations, April 5-6, J. R. Jensen, $30; oral surgery, April 30-May 4, H. B. Clark, Jr., $50; crown and bridge, July 9-12, D. H. Yock, $40. Further information may be obtained from the director of the center for continuation study at the school, Minneapolis 14.

Mount Sinai Hospital • The dental and oral surgery service of the Mount Sinai Hospital is accepting applications for internships and residencies for the calendar year beginning July 1, 1962. Selections generally are made in December, so applications should be sent in as soon as possible. Further information may be obtained from Max Fuchs, assistant director at the hospital, 11 E. 100th St., New York 29.

New York • The First District Dental Society of New York will present the following courses: Oral reconstruction, emphasizing esthetics, using porcelain jackets and porcelain fused to gold, December 1-2, Herbert H. Kabnick, $100; removable precision bridge technics in reconstruction diagnosis and the approach treatment, December 12-16, I. Franklin Miller, $175; advanced thinking in partial denture case analysis, January 12, Joel Friedman, $40; practical radiodontics, new concepts and improved technics, January 24, Joseph J. Martini, $30. Further information may be obtained from the postgraduate education program of the society, Statler Hilton, New York 1.

Northwestern • The Northwestern University Dental School has announced the following postgraduate courses, memorial lectures and conferences: functional analysis and treatment of the masticatory system for the orthodontist, December 4-6, Glenn E. Jackson, $150; the role of the prosthodontist in oral rehabilitation, January 17, Roy Storer; functional analysis and treatment of the masticatory system for the general practitioner, January 22-24, Harold T. Perry, $125; basic cephalometric radiography, February 12-14, John R. Thompson, $100; pedodontics, February 15-16, Norman H. Olsen, $100; basic oral surgery, March 19-23, Orion H. Stuteville, $240; major oral surgery, March 19-23, Orion H. Stuteville, $300; complete denture procedures, March 26-29, A. H. Grunewald, $200; a practical approach to the use of gold foil, April 9-10,

Arne F. Romnes, $100; oral surgery in general practice, April 9-13, Orion H. Stuteville, $250; orientation for hospital dental service, April 25-27, Eduard G. Friedrich, $75; the new age in dentistry, May 2, Don W. Gullett; endodontics, May 7-8, Michael A. Heuer, $150; and current concepts in operative dentistry, May 14-16, Arne F. Romnes, $150. Further information may be obtained from the director of dental postgraduate study at the school, 311 E. Chicago Ave., Chicago 11.

Pennsylvania • The University of Pennsylvania School of Dentistry is offering the following postgraduate courses: Practical procedures of oral rehabilitation, part I, January 15-19, Ernest R. Granger, William Maxwell and Robert Simpson; orthodontic treatment planning and associate appliance therapy, January 22-23, William L. Wilson; cephalometry, January 22-25, Viken Sassouni; impacted teeth, January 24-26, Victor H. Frank and associates; periodontal prosthesis, February 5-9, Morton Amsterdam and D. Walter Cohen; partial dentures, February 26-March 2, M. M. DeVan and associates. Further information may be obtained from the department of postgraduate courses at the school, 4001 Spruce St., Philadelphia 4.

The school is also accepting applications for two clinical fellows in oral pathology supported by the American Cancer Society, for a period of one year beginning July 1, 1962. These fellowships are open to United States citizens who are graduates of a United States dental school. There is a stipend of $3,600 (tax free). Each candidate should submit a curriculum vitae and letters of reference to: Lionel Gold, Department of Pathology at the school.

Philadelphia General Hospital • The Philadelphia General Hospital is offering a one year rotating internship in dentistry. Application forms are available from Fred J. Lucchesi, chief of the department of dentistry at the hospital, 34th St. and Curie Ave., Philadelphia 4.

Pittsburgh • The University of Pittsburgh School of Dentistry has announced that applications are now being accepted by the graduate division for study in the fields of anesthesiology, oral surgery, orthodontics, periodontics and prosthodontics, leading to the master of science degree. Selection of students for the fall session of 1962 will be made in March, 1962.

A non-degree, full-time, 12 month course in general anesthesia is also available for qualified dental graduates. The Schools of the Health Professions are also offering graduate study in the preclinical basic sciences of anatomy, biochemistry, microbiology, pathology, pharmacology and physiology, leading to the master of science or doctor of philosophy degrees. Successful applicants in this latter program are eligible for financial assistance in the form of traineeships. Further information may be obtained from the director of graduate education at the school, Pittsburgh 13.

Temple • Temple University School of Dentistry has announced the following courses for 1962: Implant dentures, January 8-12, Aaron Gershkoff, and Norman I. Goldberg, $200; periodontal prosthesis, Morton Amsterdam and D. Walter Cohen, February 5-9, $275; pedodontics for the general practitioner, February 12-16, Ernest F. Ritsert, $175; practice administration, February 17, Jay H. Eshleman, $25; advanced fixed prosthesis, February 19-24, George Straussberg, $200; electronic electrosurgery, March 7-8, Maurice J. Oringer, $60; transographics seminar, March 30-31, William A. Miller, $75 (includes a dinner); immediate surgical endodontics, April 2-6, Leonard Parris, $200; advanced surgical technics in periodontal therapy, April 9-13, Saul Schluger, and Jack Alloy, $300; full denture seminar, May 5, Bernard Jankelson, $30 (includes a luncheon); full denture prosthesis, May 7-11, Bernard Jankelson, $200. Further information may be obtained from the graduate and postgraduate department of the school, Broad above Allegheny Ave., Philadelphia 40.

Toledo • The Toledo Dental Society is sponsoring a meeting on modern periodontics and its service to dentistry, January 10-11, by Paul Schluger. Further information may be obtained from Milo Danzeisen, 424 W. Woodruff, Toledo 2, Ohio.

Toronto • The following postgraduate courses will be offered by the University of Toronto Faculty of Dentistry: Pedodontics, January 8-9; anatomy, normal and pathological, February 7-9; endodontics, February 28-March 2; orthodontics, March 5-9; oral surgery, April 23-27; periodontics, May 7-11. Further information may be obtained from the chairman of the division of postgraduate studies at the school, Toronto, Ontario, Canada.

Tufts • Tufts University School of Dental Medicine in its program of continuing education is offering the following courses: Hospital management of the dental patient, February 7-9, Richard Taylor, $100; crown and bridge

design and construction, February 15-16, Frank A. Eich, $75; a participation course in applied anatomy of the head and neck, February 28-March 2, Alton D. Brashear, $100; orthodontic principles of interest to the general practitioner, February 28 for 6 Wednesdays, Drs. Shapiro, Mendeloff and Field, $200; complete mouth rehabilitation through fixed partial denture prosthodontics, February 28 for 6 Wednesdays, Harry Kazis and Albert J. Kazis, $250; the diagnosis, management and therapy of lesions of the oral mucosa, March 7 for 8 Wednesdays, Philip McCarthy, Francis P. McCarthy and Gerald Shklar, $125; surgical pathology of the mouth and jaws, March 8 for 8 Thursdays, Irving Meyer, Gerald Shklar and staff, $125; prosthetic procedures for the periodontal problem, April 5-7, Louis Alexander Cohn, $150; a special participation course in periodontology, April 9-13, Irving Glickman, $175; clinical adjustment of the occlusion, May 2-4, Bernard Jankelson, $125; minor oral surgery, May 8-10, Richard Taylor and staff, $125; children's dentistry for the general practitioner, May 21-23, Sidney B. Finn, $125. Further information may be obtained from L. Walter Brown, Jr., director of postgraduate refresher courses at the school, 136 Harrison Ave., Boston 11.

Veterans Administration Hospital • The Veterans Administration Hospital of New Orleans is accepting applications for a one-year rotating dental internship which begins July 1, 1962. Further information may be obtained by writing to the chief of dental service at the hospital, 1601 Perdido St., New Orleans 12.

Veterans Administration Hospital • The Veterans Administration Hospital of Philadelphia is offering two one-year rotating dental internships, starting July 1, 1962. Further information may be obtained from S. L. Orlean, chief of the dental service at the hospital, Philadelphia 4.

Veterans Administration Hospital • The Veterans Administration Medical Teaching Group Hospital of Memphis, Tenn., has available one rotating dental internship and two residencies in prosthodontics for the year beginning July 1, 1962. Information and application forms may be obtained from the chief of the dental service at the hospital, Park Ave. and Getwell St., Memphis 15.

Virginia • The Medical College of Virginia School of Dentistry has announced the following courses: Dental therapeutics, March 5-7, F. B. Wiebusch, H. M. Syrop and D. H. Bell, $125 including single room and meals for three days; anatomy of the head and neck, March 12-16, A. D. Brashear, $75; oral surgery, April 2-4, S. E. Bear, W. J. Longan and P. B. Peters, $75; removable partial dentures, D. H. Bell, F. W. Salisbury and C. M. Heartwell, $75; complete denture prosthesis, April 6-8, C. M. Heartwell, D. H. Bell, and F. W. Salisbury, $75; clinical photography, April 9, M. C. Shaffer and P. J. Modjeski, $25; and oral roentgenology, April 11-13, L. D. Mitchell, Jr., and C. D. Richardson, $75. Further information may be obtained from H. T. Knighton, director of postgraduate instruction at the school, Richmond 19.

Washington • The University of Washington School of Dentistry, department of postgraduate dental education, will present a refresher course in the appearance and function in complete and partial denture prosthesis, January 2-3, Earl Pound, $40. Further information may be obtained from the school in Seattle.

West Virginia • The West Virginia University School of Dentistry, division of postgraduate refresher courses, will present the following courses: Complete denture prosthesis, February 12-13, J. B. Davis and J. C. Eselman, $50; practical oral surgery for the general practitioner, April 2-4, J. L. Campbell and T. W. Jones, $90; orthodontics for the general practitioner, May 28-30, V. Sassouni and Dean Forrest, $90; pedodontics for the general practitioners, May 7-8, S. A. Poleway and R. McDonald, $50; today's concepts of root canal therapy, June 25-26, W. R. Biddington, $50. Further information may be obtained from the division of postgraduate studies at the school, Morgantown, W. Va.

Public Health

EXAMINATIONS FOR OFFICERS IN PUBLIC HEALTH DENTISTRY

Competitive examinations for appointment of dentists as officers in the Regular Corps of the Public Health Service Commissioned Corps will be held throughout the United States on February 13, 14, and 15. Requirements for candidates include U.S. citizenship and graduation from a recognized school of dentistry. Further information and application forms may be obtained from the Surgeon General, Public Health Service (P),

Washington 25, D.C. Completed application forms must be received no later than January 5.

JOHN A. KNUTSON RECEIVES PUBLIC HEALTH MEDAL

Assistant Surgeon General (Ret.) John W. Knutson, former chief dental officer of the Public Health Service Commissioned Corps, on November 3 received the Corps' highest award, the Distinguished Service Medal.

The medal was awarded to Dr. Knutson "in recognition of his leadership and positive contribution toward bettering the health of mankind in the area of dental health. His professional attainments have reflected in significant advances made by the Service in dental public health, training, research, and clinical dentistry. . . ."

General

PENNSYLVANIA CANCER SOCIETY HONORS ROBERT B. SHIRA

The American Cancer Society's Pennsylvania Division recently presented its highest individual award, the Order of the Sword of Hope, to Col. Robert B. Shira, chief of the oral surgery section, dental service, Walter Reed General Hospital. It was the first time that the award had been given to a dentist.

Colonel Shira was cited for his outstanding service to the program of cancer control. The citation read in part: "He has been a major force in developing the division's present professional education program in oral cancer. His contribution to the cause of control of oral cancer has been inestimable, as the hundreds of dentists and other medical professionals who have attended oral cancer institutes enthusiastically attest."

Colonel Shira has spoken at ten oral cancer institutes held since 1957 and has helped in the planning of each institute since the first.

LYALL O. BISHOP ELECTED PRESIDENT OF ORAL SURGEONS

The American Society of Oral Surgeons elected officers during the society's forty-third annual meeting, October 7-13, aboard the *M.S. Bergensfjord* while on a cruise between New York and Bermuda. New officers are: President, Lyall O. Bishop, Walnut Creek, Calif.; president-elect, Edward C. Thompson, Champaign, Ill.; vice-president, John S. McQuade,

Mario M. Chaves (l.), regional adviser in dental health, Pan-American Health Organization of the World Health Organization, addresses the International Guests Luncheon, held October 17 in Philadelphia during the Association's annual session. Listening is Obed H. Moen, U.S.A. treasurer, Fédération Dentaire Internationale.

Ventnor City, N.J.; secretary-treasurer, Leroy W. Peterson, Clayton, Mo.; and members of the executive council, Irwin T. Hyatt, Atlanta, and Wayne H. Speer, Houston, Texas.

ST. LOUIS ORTHODONTIC GROUP TO MEET FEBRUARY 25-27

The fifth annual meeting of the Orthodontic Education and Research Foundation of St. Louis University will meet, February 25-27, at the Chase Hotel in St. Louis. Speakers will include Charles Tweed, Hugh Sims, Edward J. Forrest and LeRoy Peterson. Further information may be obtained from Philip Levens, 8230 Forsythe Blvd., Clayton, Mo.

E. A. GUGGENHEIM HONORED BY CHILDREN'S DENTISTRY GROUP

Edmond A. Guggenheim, president of the Murry and Leonie Guggenheim Foundation and Dental Clinic, and founder of the Guggenheim Dental Research Center at New York University, was chosen man of the year and awarded a plaque by the New York State Society of Dentistry for Children.

The presentation took place at the Saranac Lake Inn, New York, September 16, during the midyear meeting of the society. The award was made to Mr. Guggenheim for his "outstanding contributions to the dental health of children."

REPLANTATION REGISTRY STARTED AT PENNSYLVANIA

The University of Pennsylvania has started a registry for replantation cases. The purpose of the registry is to keep accurate records of teeth that have been avulsed and replanted in their sockets in order to determine the probable lifespan of such teeth, and the best method of treatment.

Dentists desiring to register their cases with the Replantation Registry may send for a folder, the cost of which is $1. The folder consists of a roentgenogram mount, a questionnaire providing information on the procedure which was used in replanting teeth, and an instruction sheet for replanting teeth, but the instructions need not be followed in order to register cases.

The school plans to publish a progress report every three years and those participating will be named as co-authors of the report. Folders may be obtained from: Replantation Registry, Endodontic Department, School of Dentistry, University of Pennsylvania, Philadelphia 4.

WESTERN PERIODONTISTS TO MEET IN LAS VEGAS

The Western Society of Periodontology will hold its ninth annual scientific meeting March 18-20 at the Tropicana Hotel in Las Vegas. Emanuel Cheraskin will be the guest speaker. Further information may be obtained from H. Leslie Levine, 9400 Brighton Way, Beverly Hills, Calif.

GENERAL DENTISTRY ACADEMY TO GRANT FELLOWSHIP AWARDS

The Academy of General Dentistry will present its first fellowship awards at its tenth annual meeting, February 18, held in conjunction with the 1962 midwinter meeting of the Chicago Dental Society. Academy fellowship is an earned distinction, granted to candidates who demonstrate at least 500 hours (one semester) of postgraduate or refresher course work and have been Academy members for five years or more. Published articles and significant contributions to dental education and organization also are credited in part toward the 500 hour requirement.

The meeting will take place in the Sheraton-Blackstone Hotel in Chicago. Lon W. Morrey, editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, will deliver the main address. Further information may be obtained from A. L.

Knab, secretary, 8500 Stony Island Ave., Chicago 17.

AMERICAN ORAL PATHOLOGY ACADEMY TO MEET IN APRIL

The American Academy of Oral Pathology will hold its 1962 meeting in Indianapolis, April 5-7. Requests for registration at the annual slide seminar must be made by January 15 for Fellows, February 15 for members and March 15 for guests. Only 60 places may be reserved.

Application for elevation to Fellowship must be submitted by January 1 and for membership by February 1. Application forms and further information may be obtained from Robert J. Gorlin, professor and chairman, division of oral pathology, University of Minnesota School of Dentistry, Minneapolis 14.

ORAL PATHOLOGY INSTITUTE TO CELEBRATE THIRTY YEARS

The New York Institute of Clinical Oral Pathology will celebrate its thirtieth anniversary with an all-day meeting, November 30, 1962, at the New York Academy of Medicine. The medical, dental and allied professions are invited to attend. Further information may be obtained from Theodor Blum, secretary, 101 E. 79th St., New York 21.

NORTHEASTERN ORTHODONTISTS TO MEET MARCH 11-13

The annual meeting of the Northeastern Society of Orthodontists will be held March 11-13 at the Waldorf Astoria Hotel in New York. Further information may be obtained from David Mossberg, 36 Central Park South, New York 19.

PRACTICE ADMINISTRATION ACADEMY TO MEET IN MARCH

The Illinois Academy of Dental Practice Administration will hold its Spring meeting at the Pere Marquette Hotel in Peoria, Ill., March 18-19. "Goldie" Archanna Morrison will speak on "Efficiency in the dental office and good practice administration." After dinner, Mr. L. L. Cunningham will discuss "Human relations." Further information may be obtained from Frank Fabian, 4753 N. Broadway, Chicago 40.

Hubert MacGeorge of Collingswood, N.J. (r.), who attended the annual session of the Association for the forty-sixth time, looks over the program in Philadelphia with Nicholas Collova of Atlantic City, N.J., a senior student at Temple University School of Dentistry, who attended his first session this year. Earlier this year, Dr. MacGeorge observed his fiftieth year in the dental profession and was presented with a plaque from the Southern Dental Society of New Jersey.

NEW OFFICERS OF AFFILIATED GROUPS IN THE DENTAL FIELD

American Academy of Gold Foil Operators • President, George A. Ellsperman, Bellingham, Wash.; president-elect, Henry A. Merchant, Omaha; secretary-treasurer, Charles C. Latham, Coronado, Calif.; editor, José E. Medina, Baltimore, Md.

American Academy of the History of Dentistry • President, James M. Courtney, Cleveland; president-elect, Gardner P. H. Foley, Baltimore, Md.; secretary-treasurer, Milton B. Asbell, Camden, N.J.; vice-president, Harry Lyons, Richmond, Va.; editor, George B. Denton, Chicago.

American Academy of Implant Dentures • President, Arthur A. Kulick, New York; president-elect, E. R. Hinrichs, Lincoln, Neb.; vice-president, V. L. Beck, Hastings, Neb.; secretary, A. Norman Cranin, Brooklyn, N.Y.; treasurer, Theodore C. Lee, San Francisco; editor, Arthur C. Jermyn, Rochester, N.Y.

American Academy of Oral Roentgenology • President, Harry D. Spangenberg, Jr., Columbus, Ohio; president-elect, Albert G. Richards, Ann Arbor, Mich.; vice-president, Theodore S. Grant, San Francisco; secretary-treasurer, Angus W. Grant, Bethesda, Md.; editor, Arthur H. Wuehrmann, Birmingham, Ala.

American Academy of Pedodontics • President, William E. Cody, Denver, Colo.; president-elect, Albert L. Anderson, San Diego; secretary-treasurer, James H. Simmons, Fort Worth, Texas.

American Association of Dental Examiners • President, H. Arthur Zappe, Mineral Wells, Texas; president-elect, F. Wayne Graham, Morris, Ill.; first vice-president, Ralph L. Spaulding, Monticello, N.Y.; second vice-president, Sau Yee Chang, Kauai, Hawaii; third vice-president, R. P. Taylor, Jr., Jacksonville, Fla.; secretary-treasurer, C. J. Schweikhardt, Maplewood, N.J.

American Board of Dental Public Health • President, Donald J. Galagan, Washington, D.C.; vice-president, John T. Fulton, Chapel Hill, N.C.; secretary-treasurer, Polly Ayres, Birmingham, Ala.

American Board of Oral Surgery • President, Athol L. Frew, Jr., Oklahoma City, Okla.; vice-president, James R. Hayward, Ann Arbor, Mich.; executive secretary, Leslie M. FitzGerald, Dubuque, Iowa.

President-elect Gerald D. Timmons (r.) congratulates Floyd D. Ostrander, Ann Arbor, Mich., who succeeds him as speaker of the House of Delegates. The gavel was presented to the American Dental Association by Dr. Timmons in appreciation of his six terms as speaker. Designed by him, it is made of woods furnished him by all the constituent societies and federal dental services. A similar gavel was presented by Dr. Timmons to the Fédération Dentaire Internationale in 1960.

American Board of Pedodontics • Chairman, Ralph E. McDonald, Indianapolis; vice-chairman, David B. Law, Seattle, Wash.; secretary-treasurer, Ralph L. Ireland, Lincoln, Neb.

American Dental Assistants Association • President, Miss Corinne Dubuc, Pawtucket, R.I.; president-elect, Miss Ruth Asp, Minneapolis; first vice-president, Mrs. Alberta Reed, Massillon, Ohio; second vice-president, Miss Barbara Blomquist, Belmont, Mass.; third vice-president, Mrs. Edna Zedaker, Charlotte, N.C.; secretary, Mrs. Alice Eder, Camden, N.J.; treasurer, Mrs. Harriet Darling, Huron, S.D.; editor, Mrs. Violet Crowley, Houston, Texas.

American Dental Hygienists' Association • President, Miss Ann Ragsdale, Atlanta, Ga.; president-elect, Mrs. Margaret Hunt, Fort Wayne, Ind.; first vice-president, Mrs. Janet Burnham, Halifax, Nova Scotia; second vice-president, Mrs. Irene Murphy, Los Angeles; speaker of the house, Miss Marjorie Thornton, Des Moines, Iowa; executive secretary, Miss Margaret Swanson, Chicago; treasurer, Miss Ruth Heck, Philadelphia; editor, Miss Lucille Klein, Detroit.

American Dental Society of Anesthesiology • President, I. Lawrence Kerr, Endicott, N.Y.; first vice-president, Bruce L. Douglas, Berkeley, Calif.; second vice-president, Daniel F. Lynch, Washington, D.C.; secretary, Harry Sultz, Buffalo, N.Y.; treasurer, Joseph P. Osterloh, San Francisco; editor, J. D. Whisenand, Iowa City, Iowa.

American Prosthodontic Society (formerly the American Denture Society) • President, Homer C. Vaughan, New York; president-elect, Alfred E. Smith, New Orleans; vice-president, G. J. Perdigon, Tampa, Fla.; secretary-treasurer, Victor L. Steffel, Columbus, Ohio; editor, Carl O. Boucher, Columbus, Ohio.

American Society of Dentistry for Children • President, Ralph E. McDonald, Indianapolis; president-elect, Victor Lenchner, Miami Beach, Fla.; vice-president, Wesley O. Young, Boise, Idaho; secretary, Richard E. Jennings, Houston, Texas; editor, Alfred E. Seyler, Detroit.

Association of American Women Dentists • President, Virginia Englett, Atlanta, Ga.; president-elect, Betty Ross, Indianapolis; secretary-treasurer, Ellen Crockett, Miami, Fla.

Federal Dental Services Officers Association • President, Phelps J. Murphey, Dallas, Texas; vice-president, Robert E. Englert, Great Falls, Mont.; secretary-treasurer, Rodney G. Mitchell, Dallas, Texas.

International College of Dentists (USA section) • President, Roy F. West, Seattle, Wash.; president-elect, Gordon L. Teall, Hiawatha, Kan.; vice-president, Hugo M. Kulstad, Bakersfield, Calif.; treasurer, Thomas J. McDermott, Cleveland, Ohio; registrar, H. O. Westerdahl, Minneapolis.

International College of Dentists • President, Fred A. Richmond, Kansas City, Kan.; president-elect, C. I. Perschbacher, Appleton, Wis.; vice-president, Percy T. Phillips, New York; secretary-general, H. O. Westerdahl, Minneapolis; treasurer, Herbert W. Mason, Indianapolis.

State Officers Conference • President, Alvin B. Coxwell, Jr., executive secretary of Kentucky Dental Association; vice-president, Paul W. Clopper, secretary of Illinois State Dental Society; secretary, Crawford A. McMurray, secretary of Texas Dental Association.

Women's Auxiliary to the American Dental Association • President, Mrs. John W. Berk, Reading, Pa.; president-elect, Mrs. Raymond E. Myers, Louisville, Ky.; recording secretary, Mrs. Francis J. Mullin, Concord, N.H.; treasurer, Mrs. Harold Oswald, Bellingham, Wash.; editor, Mrs. Cecil W. Neff, San Diego; first vice-president, Mrs. G. N. Casto, Jr., Charleston, W. Va.

American College of Dentists • President, Henry A. Swanson, Washington, D.C.; president-elect, Phillip E. Blackerby, Jr., Battle Creek, Mich.; vice-president, Crawford A. McMurray, Ennis, Texas; secretary, Otto W. Brandhorst, St. Louis; editor, Thomas F. McBride, Columbus, Ohio.

DALLAS DENTAL CLINIC TO BE HELD JANUARY 21-24

The thirty-fifth annual session of the Dallas Mid-Winter Dental Clinic will be held January 21-24 at the Statler Hilton Hotel in Dallas, Texas.

Speakers will include Miles R. Markley, amalgam restorations; David A. Hoffman, time and motion; Jerome M. Schweitzer, oral rehabilitation; Daniel J. Holland, oral surgery; Vincent R. Trapozzano, prosthetics; Wallace N. Kirby, practice management; K. E. Lawrence, pedodontics; Arthur Elfenbaum, oral medicine; and Harry M. Bohannon, periodontics.

Mrs. Helen M. Constable will speak on better utilization of auxiliary personnel in the dental office.

Further information may be obtained from Joel F. Goodwin, Medical Arts Building, Dallas, Texas.

international dentistry

News from Great Britain

Dental Education • The September 5 issue of the *British Dental Journal* is the annual educational number and well worth reading and keeping for reference, especially for those interested in dental education. There is an editorial, "The design of dental schools," and five articles, which include: "The new Birmingham Dental School" by Alexander Macgregor; "The facilities for dental education" by A. D. Hitchin; "The University of Otago Dental School" (New Zealand) by Sir John Walsh; "A dental curriculum" by James Scott; and "An assessment of the changing basis of dental education" by C. I. Wallis.

The first three contribute much to the planning and design of new dental schools, the last two present ideas on the future curriculum of a dental school to meet the requirements of modern dental practice. There is an educational supplement which supplies information on postgraduate education, a directory of dental schools and governing bodies, higher dental degrees and diplomas, and dominion qualifications recognized by the General Dental Council as qualifying for admittance to the Dental Register.

Dental Fitness • The September issue of *The Executive Council*, a publication about the National Health Service, contains an article, "How fit is fitness" by Edward Samson in which the following excerpts appear:

"Sometimes it is the unenviable task of a Dental Service Committee to decide if a practitioner has provided 'reasonable dental fitness,' as distinct, one may suppose, from unreasonable dental fitness. But what exactly does the term imply? . . .

"Firstly, I would hazard a guess that, in legal terms, dental fitness is best described as that state in which there is a total absence of those oral pathologies and defects which any reasonable dentist would treat. . . . Academically, dental fitness is a very different, doubtful, almost unclassifiable condition. It is, at best, as every attentive student knows, that perfection which is so emphatically demanded in his textbooks, so clearly explained in neat diagrams and faultless photographs, beautifully printed on fine art paper; a little world of infallible dentistry. . . .

"[However,] dental fitness is a flexible standard which must be infinitely adaptable to the requirements, rather than to the needs, of the patients, that is, if dentists are to retain their goodwill. After all, most of us were trained according to similar precepts and theories which varied little from one school to another; but we are forced to achieve different forms of dental fitness by many different methods; only official definitions are constant, if not always interpretable. . . . The dentist modifies theory to suit practice, and exact definitions elude him. In the industrial North dental fitness is more frequently edentulousness; in the South it is a mouth full of fillings. . . .

"I only know that dental fitness is a standard which exists for each individual patient in his own right, and varies with that individual according to his age, circumstances, education and whether he is devoted to the *Reader's Digest* or the latest dental health education production.

"Attempting to practise simultaneously by legal definition and academic definition is a burdensome, almost impossible task, which greatly debilitates the practitioner. Perhaps dental fitness, is, after all, a description of the dentist's health, not of the patient's mouth."

Dentifrice with Stannous Fluoride • W. Stewart Ross, chairman of the Dental Health Committee of the British Dental Association, reported to the Representative Board on the setting up of a subcommittee to investigate the usefulness of stannous fluoride as an anticaries agent when incorporated in a dentifrice. He emphasized that the matter was of the utmost importance because of the American Dental Association's pronouncement on the

new dentifrice "Crest." The advice had been sought of 11 independent referees, including two statisticians, in the United Kingdom, Europe and Australia. The evidence submitted by Thomas Hedley Ltd., which Dr. Ross believed referred to 140 experiments, had been sent to these referees.

The subcommittee, after considering the reports of the referees, came to certain conclusions which the Dental Health Committee endorsed and which were contained in the statement embodied in the report of the Committee. Dr. Ross therefore moved that the Representative Board approve the following statement of opinion:

"On the published evidence available to date, the British Dental Association cannot especially recommend a dentifrice containing stannous fluoride as an anticaries agent for use by the public in the United Kingdom. Nevertheless it is considered that among other possible measures the incorporation of fluoride salts in a dentifrice as a means of controlling dental caries merits further investigation."

This was agreed.

The British Dental Journal • The July 18 issue of the *Journal* contains an original paper on "The relationship between malocclusion, oral cleanliness, gingival conditions and dental caries in school children" by John Miller and Pamela Hobson of the Turner Dental School, Manchester. This is an extremely interesting paper. The summary of the findings is as follows:

1. A ten-year serial investigation of dental conditions in children aged 3 to 15 years has been made and findings are presented in relation to malocclusion, gingival conditions, oral cleanliness, and dental caries.

2. Survey of malocclusion showed:

a. A range of incidence from 20 per cent at age 4 years to a high point of 50 per cent at ages 11 to 12 years, after which age the incidence decreased.

b. No significant difference in the incidence of malocclusion between boys and girls.

c. Class I malocclusion was more common than Class II or III. In Class I there was a high incidence of cross-bite. Over-bite and mesial drift were associated with extractions of deciduous molars by the age of 6 years.

d. The value of retaining all deciduous molars till normal exfoliation was observed in 181 children. These children had 29 per cent less malocclusion at ages 11 to 12 years.

3. Children with a malocclusion had poorer gingival condition and higher caries rates than children with normal occlusion.

4. More girls than boys showed regular oral cleanliness.

5. Better gingival conditions were related to regular oral cleanliness.

6. Caries rates were higher with regular oral cleanliness.

The effect of these findings on the assessment and on the prevention of dental caries is discussed at the close of the paper.

Appointment of Chief Dental Officer • Surgeon Rear-Admiral (D) W. Holgate, has been appointed Chief Dental Officer to the Ministry of Health in succession to Dr. W. G. Senior, C.B.E., who is retiring. Admiral Holgate will take up his duties on December 1.

Appointment of Royal Air Force Consultant • Air Commodore W. O. Baird, has been appointed Consultant in Dental Surgery to the Royal Air Force. This is a first appointment and as a result, the R.A.F. now has a service consultant as well as a civil consultant in dental surgery, the latter appointment being held by Sir William Kelsey Fry.

Lecture at Royal College of Surgeons • The Charles Tomes Lecture for 1961 was delivered before the Faculty of Dental Surgery of the Royal College of Surgeons of England by Prof. A. I. Darling, F.D.S., of the Dental School, University of Bristol, last July. Professor Darling's topic was "The selective attack of caries on the dental enamel." The lecture was followed by the annual meeting of the Faculty.

Greetings • The writer of this Newsletter sends Christmas greetings and best wishes for the New Year to his many friends and colleagues in the United States.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

News from Brazil

Conventions • The dental students of the Catholic University of Campinas held their seventh dental week October 15-21. The scientific program was made up of ten conferences, one round table on transplantation in oral surgery, and two courses on endodontics and radiology. In addition, there were several social activities.

A dental meeting was held in São Carlos, State of Sao Pãulo, November 3-5. It included a round-table discussion on oral rehabilitation by Palmiro Fava, João Pereira Lima, Reynaldo Todescan, and José Hildebrando Todescan.

The State of Espírito Santo will hold its first dental convention February 9-13 in

Vitória. Among the subjects to be presented are public health dental problems in Espírito Santo, prevention of tooth decay, periodontics and implant dentures. Visits to points of interest in Vitória and in the resort city of Guaraparí are part of the planned social schedule.

An American Dentist Honored • Vernon Forney, who was sent to Brazil by the International Cooperation Administration, Point Four, was made an honorary member of the Brazilian Dental Association at a ceremony in São Paulo, October 5. Several speakers listed Dr. Forney's outstanding contributions to Brazil's public health dentistry and dental teaching. One of Dr. Forney's dreams, to unify under one name all the dental associations of Brazil, has been achieved. At the end of the ceremony Dr. Forney received his honorary title and Mrs. Forney a bouquet of orchids.

New Law on Hypnotism • On July 22, a federal law was passed forbidding in Brazil any demonstration of hypnotism in clubs, on stages, radio or television. However, scientific demonstrations may be carried out by physicians who are specialists in hypnotism and if the meeting has been previously approved by the authorities. Also allowed are scientific demonstrations in schools and professional associations. The presence of people under 18 years of age is not allowed in any case.

Items of Interest • The school dental service of São Paulo is giving free topical fluoride treatments to children who go to the first Children's Fair.

The State of Alagoas dental society became a new member of the Brazilian Dental Association. Its office is located in the capital city of Maceió and its president is Dr. Anthony M. Leahy.

The Brasilia section of the Brazilian Dental Association is sponsoring conferences on preventive dentistry in all of its territory. This section is presided over by Dr. Estevam Alves Cavalcante. *Hans Fruedenthal, C.D.*

International News in General

SWEDISH DENTAL SOCIETY OPENS TOURIST HOTEL

The Swedish Dental Society is now operating a hotel, the Apollonia, in Stockholm and has invited members of the American Dental Association and other colleagues to stay in the hotel during their visit to the capital city.

The hotel contains the society secretary's office, a library, restaurant, cocktail lounge, Turkish bath and sun terrace, private dining suite and conference rooms. There is also an auditorium and a projection room.

Further information may be obtained from Sigurd Mannfelt, Appollonia—Kongressen, Nybrogatan 53, Stockholm 0, Sweden.

NEW DENTAL SECTION AND PEDODONTIC SOCIETY IN GREECE

Three professors have been appointed to the newly created Dental Section of the University of Salonica, in Greece. They are: Prof. J. Chatziotis, oral pathology; Prof. C. Vrotsos, prosthetics; and Prof. P. Giannoulis, exodontics and roentgenography.

The Pedodontic Society of Greece recently has been formed with the following officers: Prof. J. Ailianos, president; Prof. T. Mavrogordato and Prof. C. Charalambakis, vice-presidents; Dr. N. Baltas, general secretary; Dr. J. Kiapekakis, treasurer; and Prof. C. Adam and Miss Ailianos, members of the board.

Postgraduate dental courses have been held for the second consecutive year in Athens. These courses were attended by Greek dentists both from home and abroad. Lectures were given by professors of the Dental Section and of the Medical Faculty of the University of Athens.

EWALD HARNDT INSTALLED AS DEAN, BERLIN MEDICAL FACULTY

Professor Dr. Ewald Harndt, director of the Dental School of the Free University of Berlin, was installed recently as the dean of the university's medical faculty. Professor Harndt is the first dentist to serve in this capacity. As a president of the German Dental Society, Professor Harndt encouraged scientific research in German dental schools and laboratories connected with a college or university.

SPANISH ORTHODONTIC SOCIETY TO MEET IN SEVILLE

The Spanish Orthodontic Society will hold its next meeting, March 14-18 in Seville. Members of the American Dental Association have been invited to attend. Further information may be obtained from Dr. Ernesto A. Vilches Martinez, president of the society, Ave. Republica Argentino #3, Seville, Spain.

the reader comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.* *The Editor.*

HYPNOSIS IN DENTISTRY

In the January, 1961 issue of THE JOURNAL, there appeared an article, "Psychological evaluation of hypnosis in dentistry," by Borland and Epstein.

I have discussed this article with several of my colleagues and we differ with many of the statements made by the authors pertaining to the modality. Also, there seems to be an irregularity or perhaps an error in the statistical figures. The survey was to be made of 17 users of hypnosis and 17 nonusers. The total in the report, however, is 35 and the division showed 22 nonusers and 13 users.

It seems to me that a psychological evaluation of 13 users of hypnosis in dentistry is not a sufficient number for a published statement in our journal. Considering the many thousands of dentists who utilize hypnosis, this report is very lacking.

I am sure that if the authors are interested in psychological evaluations of dentists, they could find some very interesting and similar conclusions by studying groups of dentists who have taken seminars in other fields, such as oral medicine, including surgery and periodontics, and oral rehabilitation.

It seems a pity that the authors apparently started out with a negative idea. They state in the article "hypnosis, in general, is not yet held in high esteem by the dental profession." However, the Council on Insurance of the American Dental Association, in 1953 recognized hypnosis as a dental modality and instructed insurance carriers to cover hypnosis in their malpractice coverage.

I have a letter in my files which attributes the following quote to one of the authors after he had viewed several patients who were treated successfully by one of the men interviewed in the preparation of the article. "Do not confuse me with the facts; my mind is made up."

It seems to me that since the authors feel there is a place in dentistry for hypnosis in "carefully selected instances" on a qualified level, they should have devoted their research to the development of the modality of hypnosis.

Hypnosis is not a panacea in dentistry, but it is a valuable and useful implement in the armamentarium of the practicing dentist. Much can be written about hypnosis and its value in dentistry. However, this is only an opinion of a dentist who has utilized hypnosis for about 35 years.

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SHORTAGE OF DENTISTS

I was amazed by the editorial in the August, 1961 issue entitled "Problems in planning for the future." It does not approach the usual high standards of excellence which the editorial pages of our JOURNAL have achieved through the years.

Every thoughtful dentist who has studied the problem knows that there is neither a present nor a potential shortage of dentists in the United States. Yet, we must conclude from the editorial that new dental schools will be forced upon us nonetheless. References to consumption of sweets, dental insurance, inflation, urbanization prove nothing.

In Connecticut there are so many dentists that we get in each other's way. The legislature was forced to approve the construction of a school despite the fact that the majority in the General Assembly deemed it totally unnecessary. It was maneuvered in this way: The general appropriation for the University of Connecticut contained a provision for the construction of the dental school. One could not vote against the school without voting against the entire appropriation for the university. This was carried out during the last several days of the session.

Many of us cannot understand why it was necessary to resort to such shabby tactics. We also cannot comprehend why the need for new schools is apparent primarily to politicians and others not engaged in the practice of dentistry.

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SUGGESTION IN AUDIO ANALGESIA

Many dentists are coming to appreciate the role of suggestion as it relates to the audio analgesia technic. A patient visiting a dentist is to some degree emotionally charged with apprehension. He is more than normally sensitive to the doctor's manner. It is therefore most important for the operator to evidence sincere self-assurance.

The proper suggestive indoctrination of patients can lead many to assume characteristics of the hypnoidal state. I have seen this on several occasions. The so-called white sound can act as a very compelling placebo-hypnotic. It is known that the more stressful the placebo, the greater is its effect. We must be aware of this in order to make the most of the audio analgesia technic.

Should the patient experience auto-hypnosis there is no danger, for when the placebo is removed, the patient promptly alerts himself.

We must also recognize that audio analgesia can block out the pain as such, but the patient still is aware of some sensation. A properly motivated patient, and also the one in the hypnoidal state, interprets these sensations complacently, whereas an apprehensive individual panics and interprets the same stimulus as painful. This alarms him and, in turn, plunges his pain threshold further downward.

We can see that suggestion and all it implies must be investigated and understood in order to make the best use of audio analgesia.

I would also like to comment on Dr. Kilpatrick's article in the September, 1961 issue of THE JOURNAL. He states, "When audio analgesia is used, supplementary local anesthesia is still needed." To the dentist looking for authoritative information, this remark can be confusing. It would do well to inform the profession in general that this is an opinion of Dr. Kilpatrick and is not necessarily in harmony with other experienced users of audio analgesia.

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GOVERNMENT INTERVENTION IN DENTAL SERVICE

"We admit of no government by divine right. The only legitimate right to govern is an express grant of power from the governed." (President William Henry Harrison, Inaugural Address, March 4, 1841.) How much of this express grant shall dentistry concede to Uncle Sam?

There is an increasing number of dentists who would give the government vast powers. To admit a need for greater governmental influence in dental affairs concedes that private resources have failed in past years or cannot meet new challenges.

However, private enterprise, research, initiative and resources have done well without intervention. To be sure, dentistry is not perfect. Achievements are still unmet. But this does not discount the strides made in fluoridation, audio analgesia, anesthetics, refined equipment and more useful technics. Through the accumulation of many personal efforts, working often through organized dentistry, the value of dentistry as a health service has been raised to its present peak. No government aid wrought these advances. Though there are shortcomings in today's dental sphere, challenges of the past century have been handled quite well without an injection of dollars from the government.

Proponents of greater governmental influence have aimed at three prime targets. (1) Aid for indigents (all classes including young, aged, sick); (2) government-financed research; (3) federal financing of dental school construction. We do need emphasis on these areas.

But how far must we go in providing dental care for unfortunates? To advocate total care of all indigents would require a radical swing to the left. The extreme rightist approach is equally unpalatable to Americans. We must find a proper balance somewhere in between private and governmental means that will

optimally care for the "haves" and "have-nots."

Actually, dentists give much aid to indigents without receiving credit. The donated time may be an unpaid fee charged off as uncollectable. Or the fee may be quoted with full knowledge it will not be collected. The average American dentist daily gives discounts, helps families in times of distress, and works for reduced fee schedules via aid to dependent children, veterans' and welfare agencies.

In addition to the work of the dentist, there are the state and county welfare agencies, private philanthropies, Easter Seal campaigns, private nursing associations and fraternal orders helping to solve this problem without federal intervention.

Dental research may be similar to welfare dentistry in this regard. There are numerous private, commercial and state research projects each year. If they are inadequate perhaps the fault lies in the coordination of these facilities rather than in their effect. Would pump-priming by the federal government improve the quality of research? I doubt it.

Possibly a council could be established to give direction to dental research. It could make suggestions to students desiring thesis work, direct research into fields where more knowledge is needed, and point out to the profession areas bleak in scientific studies.

Senator Barry Goldwater brings out in his book, *The Conscience of a Conservative*, four points regarding federal aid to education. It takes little imagination to apply them to the sought-after federal aid to dental schools. First, he says, education is one of the powers reserved to the states by the Tenth Amendment to the Constitution; second, the need for federal funds has never been convincingly demonstrated; third, federal money is not "free" money; and fourth, federal aid *to* education inevitably means federal control *of* education.

Before dashing wildly into federal programs of dubious value let us have a cool thought or two. Dentistry has gained a high degree of self-respect during the last century. Through free means it has made gigantic scientific strides. Continuous progress must be a continual part of our art and science. But where we go is dependent not only on where we want to go but how we get there.

I suggest we check closely current trends to find the best means of progress.

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NATIONAL FLUORIDATION GROUP

Why is fluoridation having such a difficult time gaining acceptance? I have been involved directly in the fight for fluoridation for over ten years and although I am convinced of its eventual universal acceptance, the slow progress is disheartening.

All authorities agree that education of the public to the benefits of fluoridation is the answer. However, haven't we been wasting a great deal of our efforts?

Each community goes through somewhat the same procedures in its attempts to achieve its goal, spending time, money and work. It is true that the experiences of many communities have been published and are great aids, but again each community must ferret out these aids.

What is needed is a national committee on preventive dental health whose main goal for the present would be the promotion of fluoridation.

Practically every disease in the medical book has a national foundation raising funds, promoting research and spreading information. Where is a group made up largely of lay people spreading the gospel of better dental health? Why must every battle for fluoridation be fought isolated from the others?

Let us combine our forces, interest more lay people and wage a national battle for fluoridation. The possibilities for the prevention of all types of oral disease through such an organization are tremendous.

I believe the American Dental Association must take the initiative in founding such an organization. I hope that the officers and committees of the Association will give this serious consideration.

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A fourth census of dental conditions in University of Minnesota freshmen students

Wendell L. Bartholdi, D.D.S.; Eugene E. Petersen,† D.D.S., and William H. Crawford,‡ D.D.S., Minneapolis*

Decennial dental examinations of freshmen at the University of Minnesota, started in 1929, show that the percentages of teeth affected by caries were as follows: 1929, 34.8 per cent; 1939, 39.6 per cent; 1949, 49.1 per cent, and 1959, 49.3 per cent. In 1929, 1.8 per cent of the freshmen had caries-free teeth; in 1959, the percentage was 1.3 per cent. The number of filled teeth has increased sharply and significantly in the past 30 years. Freshmen examined in 1959 typically had more teeth filled, or had seen their dentist at more frequent intervals, than those students examined previously.

Initial studies dealing with the prevalence of dental caries among freshmen students at the University of Minnesota were undertaken in 1929.[1] Similar studies were carried on in 1939 and 1949 in order to obtain projected trends in caries. These data have been reported in earlier publications.[2,3]

In the previously reported findings, attention was focused on the alarming increase in the number of teeth affected by caries. Contributions made by, and conclusions drawn from, the earlier surveys, furnished the background and impetus for the present study undertaken with the group of freshmen admitted at the University of Minnesota in the fall of 1959. Thus, data are now available covering a period of three decades, providing a basis for estimating and comparing dental health trends.

Data, as in previous studies, were again obtained from a complete dental examination which was conducted in conjunction with the general physical examination required of all incoming freshmen at the University of Minnesota. Examinations in 1959 were carried on in an identical manner as in the three prior investigations, in order to minimize possible variables.

Individual teeth of each student were examined and the findings were tabulated on the basis of filled teeth, unfilled carious teeth and missing teeth. In compilation of the data, these three categories were combined and considered as teeth affected by dental caries, a pattern followed in the reports of 1929, 1939 and 1949. Teeth not falling into one or more of these groupings were considered as "sound" or "perfect" teeth.

Roentgenograms were not available and reliance was placed on clinical examination only. Third molars again were excluded in total counts and total calculations were based on 28 teeth per person. Totals of missing teeth likewise included those teeth presumed to be congenitally absent, or previously extracted for some reason other than caries. Both made up a small percentage of total missing teeth and it was felt that inclusion of these

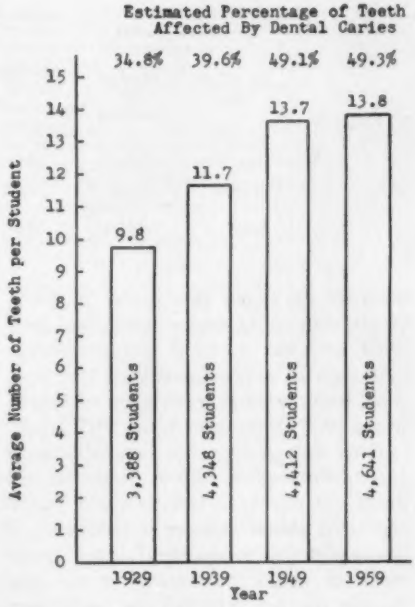
teeth would in no way affect total DMF calculations.

Striking results were apparent when the data of the earlier studies and of the 1959 survey were tabulated. Data for each of the four study periods are combined and shown in the illustration.

In 1929, the average number of teeth affected by dental caries, for both men and women, was 9.8 per student. By 1939, this average increased to 11.7 teeth affected per student. In 1949, this figure again increased to 13.7 per student. In 1959, the average number of teeth affected was found to be comparable to the average of 1949 indicating a stabilization of this upward trend during the past decade. The estimated percentages of teeth affected by caries, for both groups, were found to be 34.8, 39.6, 49.1 and 49.3 per cent for the years 1929, 1939, 1949 and 1959 respectively. All differences with the exception of the last ten year interval are significant. In 1959, the number of teeth affected by caries was noted to be slightly higher in the women as shown in Table 1. However, this difference may not be statistically significant.

As might be expected, the percentage of "sound" teeth was likewise found to be influenced by this caries rate. Of the 3,388 students examined in 1929, 61 or 1.8 per cent, were entirely free of caries. By comparison, a significant decrease in the number of caries free individuals was observed in 1959, 30 years later, when only 62 of 4,641 students, or 1.3 per cent, were caries free. Fewer perfect mouths were found in the women as compared to the men. Only 11, or 0.7 per cent, of the women were found with perfect mouths as compared to 51, or 1.7 per cent, of the group of men examined.

The degree of deterioration was slightly greater among the women as a group. This was indicated by a rather consistent decrease in percentage of sound teeth through the three decades. For the men, averages of percentages of sound teeth in 1959 tended to be slightly higher as compared to the 1949 group, as shown in Table 2. Upper and lower right quadrants are shown for purposes of comparison only.



Average number of teeth per student affected by dental caries

Findings reported in 1949 indicated the teeth most commonly affected by caries were the first molars, second molars, second and first bicuspids in that order. Anterior teeth had considerably less decay. This held true again in 1959.

Further evidence of the trend in caries frequency is shown in detail in Table 3. The number of fillings has increased sharply during the past three decades, and in each instance has proved to be a significant increase. Unfilled carious teeth or missing teeth did not follow any consistent pattern that would permit any valid conclusions.

These findings suggest several features which should not be overlooked. These data would indicate that the freshmen students examined in 1959 typically had more teeth filled, or had seen their dentist at more frequent intervals, than those

Table 1 • Comparison of dental findings for men and women in the 1959 freshmen studies

Sex	Number of freshmen	Average number of sound teeth	Average number of filled teeth	Average number of carious teeth	Average number of missing teeth
Men	3,035	14.9	11.3	1.3	0.8
Women	1,606	14.0	12.3	1.1	0.9
Total	4,641	14.6	11.7	1.3	0.8

students examined previously. In 1929, 86 per cent of the carious teeth had been filled, whereas in 1959 this percentage had risen to approximately 90 per cent. Also, fewer missing teeth were evidenced in the 1959 group than in the 1949 group.

Even though apparent adequate dental care of the teeth is adhered to by the students examined (a group which would represent above average individuals), it seems plausible to assume that the prevalence of dental caries during the past decade was not retarded but had shown some slight, but significant, gains. Comparable total DMF calculations were obtained for both 1949 and 1959 since the increase in frequency of filled teeth obviously was balanced by the decrease in number of extracted teeth in the 1959 group. Perhaps, because of more dental care, more affected teeth have been saved through fillings for this group than for those students in previous years.

It was suggested by Brekhus[3] in his 1951 report that despite all of the more recent strides and advances of the modern age, dental benefits during the period 1929 to 1949 appeared to lag behind the force or tendency aiding the deterioration of human dentition. The 1959 study ap-

Table 2 • Percentages of sound teeth found in University of Minnesota freshmen students for years, 1929, 1939, 1949, and 1959

Year	Tooth number							Average 1–7
	1	2	3	4	5	6	7	
				Upper right—men				
1929	72.5	73.4	92.9	70.2	64.0	21.0	45.7	62.8
1939	71.6	71.2	91.3	60.1	55.8	13.1	24.0	55.3
1949	57.0	58.5	79.0	45.5	38.5	8.5	17.5	43.5
1959	61.9	61.6	83.7	48.5	43.7	9.1	20.1	46.9
				Lower right—men				
1929	97.0	96.7	97.4	89.0	69.8	18.0	34.4	71.8
1939	96.9	97.4	97.8	85.5	63.2	9.8	17.3	66.8
1949	93.4	93.5	94.4	71.5	43.1	7.2	11.5	59.2
1959	92.9	93.8	95.1	73.7	44.8	7.1	12.9	60.0
				Upper right—women				
1929	70.3	73.1	92.5	65.0	62.7	9.5	23.1	56.6
1939	68.7	73.2	88.4	58.7	50.0	10.1	17.6	52.4
1949	60.0	62.0	81.0	42.5	35.2	9.5	13.6	43.4
1959	60.5	61.6	81.6	43.2	36.5	7.0	12.1	43.2
				Lower right—women				
1929	97.4	97.9	98.7	90.0	68.0	9.3	10.3	67.4
1939	97.8	98.0	98.2	85.6	60.0	8.6	14.1	66.0
1949	96.7	96.6	96.5	72.5	34.0	6.1	9.1	58.8
1959	94.2	94.5	94.1	68.4	35.9	4.5	7.7	57.0

Table 3 • Comparison studies of total filled teeth, unfilled carious teeth, missing teeth, and DMF for University of Minnesota freshmen students, 1929, 1939, 1949, 1959

Year	Number of students	Per 1,000 students				Relative DMF rating
		Fillings	Unfilled carious teeth	Missing teeth	DMF	
1929	3,388	7,837	1,245	707	9,789	100
1939	4,348	8,858	1,439	781	11,707	120
1949	4,412	11,410	1,213	1,112	13,735	140
1959	4,641	11,725	1,310	801	13,836	141

Table 4 • Average age, height and weight of University of Minnesota freshmen students, 1929, 1939, 1949, and 1959

Year	Men			Women		
	Average age	Average height	Average weight	Average age	Average height	Average weight
	(Years)	(Inches)	(Pounds)	(Years)	(Inches)	(Pounds)
1929	19.0	68.6	142.5	18.1	63.5	123.0
1939	18.9	68.9	147.8	18.5	64.4	124.4
1949	19.6	69.6	153.8	18.6	64.5	126.3
1959	19.2	69.7	155.5	18.9	64.9	128.2

parently supports this statement.

As pointed out in the second study,[2] the average man or woman admitted to the University of Minnesota freshman class in 1939 had approximately one more tooth that had been affected by dental caries than the average student admitted in 1929. Alarming as it may seem, by the same comparison, the average student entering in 1959 had approximately four more teeth affected by dental caries. That this is a decided upward trend should be a matter of some concern, especially when one considers that these surveys were done among students representing perhaps an above average socioeconomic group in generally excellent health.[4] Students in each of the four surveys were approximately the same age and varied only slightly in average height and weight as shown in Table 4.

It would seem apparent that much remains to be learned in the quest for knowledge of caries and caries control. Present and future studies in basic research no doubt will lead the way in helping to solve the problem.

With the completion of the 1959 investigations, trends for 30 years have been observed and a definite pattern and groundwork have been established in outlining future studies of this type. It is hoped that records will be obtained again in 1969 to aid in interpreting long-term trends.

The data presented in the previous surveys (1929, 1939, 1949) have been recalculated to allow valid and statistical comparison with the 1959 data. Some slight changes are noted in the general average of the earlier data which in no way alter the trends or conclusions of the previous publications.

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†Assistant professor, division of oral diagnosis and radiology, School of Dentistry, University of Minnesota.

‡Dean, School of Dentistry, University of Minnesota.

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A local dental society provides all its members with a workable public relations program

J. S. Frost, D.D.S., Pittsburgh

For ten months the Allegheny Kiski Dental Society has provided the five local newspapers with news stories and photographs about advances in dentistry, as presented by clinicians. The newspapers have printed 836 column inches of publicity. Dental society members find new patients coming into their offices asking for the new and better dentistry which they have read about. The public relations program has generated much good will for local dentists.

The publicity committee of the Allegheny Kiski Dental Society felt that the general public was interested in the progress of dental art and science and that more people would visit dentists if they could associate the new ideas with the names and faces of the local practitioners. The neighborhood dentists would no longer be strangers to the majority of the population as in the past. Each news story of the monthly meetings was to include information about advances in dentistry, as presented by the various clinicians, and photographs of the clinician with some of the dentists attending the meeting.

The headlines indicate the type of news story presented to the public:

"High speed equipment is saving your teeth"

"Dentists told how to make dentures before extractions"

"Tooth decay era near end, say dentists"

"Dental esthetics stressed in talk to dental society"

"Dental unit hears talk on antibiotics"

The officers felt that such an activity was a proper and needful one for a component of the American Dental Association. They spent many months working out the details of the plan before presenting it to their members. They came to the conclusion that this attempt at ethical publicity could be successful when carried out at the local level working with the facilities that were available and without spending any money. They hoped that by this means they could secure for their members that which the members could not secure for themselves, which is one reason for having an organization. As a result, the objectives of the officers were realized in a way that a national program could not hope to achieve.

One objection to this public relations plan is that the control will be in the hands of inexperienced officers in many local societies. However, it appears that in most groups there are capable and talented members waiting to be asked to serve. It becomes the duty of the officers to see these members and to put them to work. As it is difficult to rectify a mistake once it has appeared in print, the news

stories must be carefully written. The possibility of making mistakes may be reduced by establishing a clear chain of responsibility under the chairman who releases all items. It is also a good precaution to consult with the chairmen of the ethics and publicity committees of the parent or regional organization as to policies. Public relations counsellors serving the larger groups may provide helpful guidance.

The benefits to the members are so direct and so compelling that the ethical nonmembers suffer a loss by remaining out of the association. One must be a member to get the benefits as only the members who attend the meetings get the newspaper mention. The value of this program lies in the fact that the new advances in dentistry are presented giving the local dentists equal coverage with the guest clinicians. It should be understood that to have newspaper acceptance the news program must be a public service and in the public interest. The members themselves and not the officers must be kept before the public lest the audience lose interest in the whole affair. Also, the long accepted and deserved image of the dentist as a dedicated individual devoted to his work of helping mankind should be preserved and strengthened.

The well intentioned dentists who believe that all publicity should emanate from the Central Office of the American Dental Association are laboring under a misapprehension. The cost would be prohibitive. Public relations firms who handle such plans spend years in building up familiar personalities and simple slogans. A dental program could not start out with such a background regardless of how much money could be made available. It also may be doubted that the serious matter of dental health could be presented to the public through the medium of any type of entertainment, no matter how dignified.

However, the reverse is true at the local level. In the home community the local dentists are familiar personalities and well known to the general public in the same way that national celebrities are known at that level. The desirable pattern of familiarity has been built up through many years by the actual fact of their presence and professional activity. It is here, at the home town level on familiar grounds, that the profession may make the most effective use of its facilities and organization. When the home town names are coupled with an interesting or dramatic news story the combination presents strong reader appeal.

Typical publicity picture showing members of the Allegheny Kiski Dental Society with the clinician at a monthly meeting

PROCEDURE

The publicity committee started out, in the words of the chairman, with these modest goals, "To increase attendance at the branch meetings, create interest in the society's activities, and to try to arouse the public desire for new and better dentistry." In the beginning the members were advised by letter of the plans and

methods to be used. No objections were offered. There are 82 members in the branch which covers 425 square miles of suburban areas and small manufacturing towns. Of the five newspapers operating in the area, two have full-time staff photographers; the other three were provided with photographs taken with a Polaroid camera which provides glossy prints immediately of a size suitable for newspaper reproduction. The news releases, which were carefully edited prior to the meeting, the photographs and such interviews as were conducted on the spot, were delivered to each paper through its representatives or personally by the committeemen on the morning after the meetings. The five local daily newspapers have a combined circulation of 83,290. The weekly is not included in these figures. In the period of ten months covered by this report the space provided for pictures amounted to 560 inches and for the text 276 inches—a total of 836 inches.

The meeting itself, as presented by this society, is no haphazard thing. The responsibility is clearly defined and the officers and guests cooperate completely. The officers find that their problem is to locate a meeting place which can provide extra space and kitchen equipment for larger crowds than had been anticipated. Four months before the meeting the clinician is asked to contribute an outline of his presentation and a biography and photograph of himself for advance publicity. He also is requested to furnish a "gimmick" for the photographers. A moving display or working model relating to his ideas is most desirable. Drawings are acceptable. Such a feature usually is a guarantee of thorough newspaper coverage of the meeting.

BENEFITS

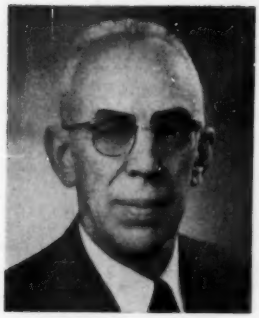
Patients remember and quote the newspaper stories for months; they have great faith in the printed word. The members find new patients coming into their offices asking for new and better dentistry which they have read about. The good will being generated in this short period of time will extend its benefits over the entire lifetime of practice for the dentists who work in this area. *185 Noble Ave.*

Science and the Human Mind • We are witnessing an unprecedented and accelerating rate of growth in man's power over his environment. Science, the instrument which produces this power, is being consciously exploited for industrial, military, and political purposes. At the same time there is little recognition of the internal needs of science, or of its purposes as a discipline of the human mind.

In this situation it is inevitable that the inner strength of science should suffer, for what is essential to the proper growth of science is often in conflict with the conditions of its service to military and political affairs. *AAAS Committee on Science in the Promotion of Human Welfare. Science and Human Welfare. Science 132:69 July 8, 1960.*

State Dental Association Presidents

1961



Marvin B. Porter
Montana

Harry L. Mertz, Jr.
Panama Canal Zone

Marvin B. Porter is president of the Montana State Dental Association. A general practitioner in Missoula, Dr. Porter received his B.A. degree in 1927 from Montana State University, and his D.D.S. degree in 1932 from Marquette University Dental School. He is a Fellow of the American College of Dentists. Dr. Porter has served as secretary and president of the Missoula County Dental Society and has filled most posts of his state association. He is a member of Sigma Chi, Omicron Kappa Upsilon, and Rotary International. Married, Dr. Porter is the father of three—Joe Gilbert, 23, Linda Mar, 19, and Margaret Ann, 8. His hobbies are singing with the men's chorus of the Mendelsohn Club, training teenagers to drive, and hunting and fishing.

Harry L. Mertz, Jr., is president of the Panama Canal Zone Dental Society. A dental officer in the U.S. Army Dental Corps, and a general practitioner, Dr. Mertz attended Gettysburg College in Gettysburg, Pa. He received his D.D.S. degree in 1956 from the Baltimore College of Dental Surgery, and the following year served a rotating internship at Valley Forge Army Hospital. He has served as secretary-treasurer and delegate to the House of Delegates for the Panama Canal Zone Dental Society. He holds membership in the Alumni Association of the University of Maryland Dental School, National Rifle Association, Caribbean Stamp Club, American Bowling Congress and Sigma Alpha Epsilon. Dr. Mertz received postgraduate training in prosthodontics at Walter Reed Institute of Research, and in crown and bridge at the Naval Dental School at Bethesda Naval Hospital. He is married and the father of three—John Franklin, 4, Judith E., 3, and Janet Lee, 10 months. His hobbies include stamp collecting, rifle and pistol shooting and deep-sea fishing.

Carl L. Busbee
South Carolina

Edgar E. Edwards
Wyoming

Harry W. Lyons
Maine

Carl L. Busbee, a general practitioner in Conway, is president of the South Carolina Dental Association. Dr. Busbee received his D.D.S. degree in 1919 from Atlanta Southern Dental College (Emory University). He has served as president of the Pee Dee District Society. He is a Fellow of the American College of Dentists, a thirty-second degree Mason, a member of the Shrine, and has served as president of the Rotary Club. Dr. Busbee is the father of one daughter, Mrs. Ella Earle Busbee Benson. His hobbies include fishing, hunting and crossroads politics.

Edgar E. Edwards, president of the Wyoming State Dental Society, is a general practitioner in Sheridan. He attended the University of Illinois from 1932 to 1934, and received his D.D.S. degree from Northwestern University in 1938. He has served as president of the Northeast Wyoming District Dental Society and the Wyoming State Board of Dental Examiners, and chairman of the Eleventh District Caucus. Dr. Edwards holds membership in the following organizations: American Society of Dentistry for Children, Pierre Fauchard Academy, Histopathology Study Club of Michael Reese Hospital, Rotary Club, Masonic Order and Shrine. He is a member of the board of trustees of Northern Wyoming Junior College, and is a member of the Episcopal Church. From 1939 to 1941 Dr. Edwards served as instructor in dental basic science courses at the Sheridan County Hospital Nurses Training School. He is married and the father of three—Susan E., 19, William S., 16, and Hugh E., 13. His hobbies are hunting, fishing and golf.

Harry W. Lyons, a general practitioner in Portland, is president of the Maine Dental Association. He received his D.D.S. degree in 1932 from the Baltimore College of Dental Surgery. He has served as secretary, treasurer and president of the Greater Portland Dental Society, and is a member of the New England Dental Society. Dr. Lyons is a member of the Masonic Order, Scottish Rite, Shrine, National Sojourners, Odd Fellows, Xi Psi Phi, the Association of Military Surgeons, and is a life member of Toastmasters. A veteran of World War II, he retired with the rank of lieutenant colonel in the U.S. Army. Dr. Lyons is on the staff of Mercy Hospital and is associate chief of dental service at Maine Medical Center. Since 1959 he has served as part-time instructor in a training course for dental assistants. He is married and the father of a daughter, Dorothy Ann Brown, 21. His hobby is organizational work.

reports of councils and bureaus

Selected excerpts from medicolegal forms

Harvey Sarner, LL.B., Chicago*

COUNCIL ON LEGISLATION

The Law Department of the American Medical Association has prepared a handy booklet entitled *Medicolegal Forms With Legal Analysis*[1] in an endeavor to maintain professional responsibility and minimize malpractice suits.

Although this booklet was prepared with the physician in mind, many of the forms with slight modification are equally applicable to the dental profession. Oral surgeons and dentists who engage in long term rehabilitation, periodontic or orthodontic treatments may especially find these forms useful in their daily practice, or for that "special patient" who is injury prone.

The following are 15 of the 47 forms which appear in *Medicolegal Forms.* Some have been modified only slightly, merely changing "physician" to "dentist." Others have been changed to a greater degree to reflect more adequately dental situations. These forms are offered only for information and guideposts and are no substitute for consultation with competent legal counsel. For maximum legal effect the forms should be carefully explained when submitted for signature.

Form 2 • Letter to confirm discharge by patient

Dear Mr. _____:

This will confirm our telephone conversation of today in which you discharged me from attending you as your dentist. In my opinion your condition requires continued dental treatment by a dentist. If you have not already done so, I suggest that you employ another dentist without delay. You may be assured that, at your request, I will furnish him with information regarding the diagnosis and treatment which you have received from me.

Very truly yours,

_____, D.D.S.

Form 4 • Letter to patient who fails to keep appointment

Dear Mr. _____:

On _____ 19____, you failed to keep your appointment at my office. In my opinion your condition requires continued dental treatment. If you so desire, you may telephone me for another appointment, but if you prefer to have another dentist attend you, I suggest that you arrange to do so without delay. You may be assured that, at your request, I am entirely willing to make available my knowledge of your case.

I trust that you will understand that my purpose in writing this letter is out of concern for your health and well-being.

Very truly yours,

_____, D.D.S.

Form 5 • Letter to patient who fails to permit x-ray

Dear Mr. _____:

At the time that you brought your son, William, to me for examination this afternoon, I informed you that I was unable to determine without x-ray pictures whether further dental treatment is required. I strongly urge you to permit me or some other dentist of your choice to make this x-ray examination without further delay.

Your neglect in not permitting a proper x-ray examination to be made may result in serious consequences.

Very truly yours,

_____, D.D.S.

Form 7 • Authorization for disclosure of information by patient's dentist

1. I authorize Dr. _____ to disclose complete information to _____ concerning his dental findings and treatment of the undersigned from on or about _____ 19____ until date of the conclusion of such treatment.

2. Further, I authorize him to testify, without limitation, as to all of his dental findings and the treatment administered to the undersigned, in any legal action, suit, or proceedings to which I am, or may become a party; and I waive on behalf of myself and any persons who may have an interest in the matter, all provisions of law relating to the disclosure of confidential dental information.

Signed _____

Place _____

Date _____

Witness _____

Form 9 • Authorization for examination of dentist's records

To Dr. _____:

I authorize you to furnish a copy of the dental records of _____,
(State name of patient or "myself")

covering the period from _____ 19____ to _____ 19____ or to allow those records to be inspected or copied by _____.

I release you from all legal responsibility or liability that may arise from this authorization.

Signed _____

Date _____

Witness _____

Form 11 • Order for taking of x-ray films

Date _____

Place _____

1. I hereby order the taking of x-ray exposures and films of parts of the person of _____ as follows: _____.

2. I agree, in part consideration of Dr. _____'s undertaking to render professional service to the person named above, that all such x-ray exposures taken and films made by Dr. _____, or by any other person at his request, whether or not paid for by the undersigned, shall become a part of Dr. _____'s professional records and shall be subject solely to his control and disposition.

3. In addition to the foregoing, I agree to pay charges in the amount of $_____ for services rendered pursuant to this order.

Signed _____
Witness _____

Form 13 • Consent to taking and publication of photographs

Patient_____ Place_____ Date_____

In connection with the dental services which I am receiving from my dentist, Dr._____ _____, I consent that photographs may be taken of me or parts of my body, under the following conditions:

1. The photographs may be taken only with the consent of my dentist and under such conditions and at such times as may be approved by him.
2. The photographs shall be taken by my dentist or by a photographer approved by my dentist.
3. The photographs shall be used for dental records and if in the judgment of my dentist, dental research, education or science will be benefited by their use, such photographs and information relating to my case may be published and republished, either separately or in connection with each other, in professional journals, or used for any other purpose which he may deem proper in the interest of dental education, knowledge, or research; provided, however, that it is specifically understood that in any such publication or use I shall not be identified by name.
4. The afore-mentioned photographs may be modified or retouched in any way that my dentist, in his discretion, may consider desirable.

Signed _____
(Patient)

Witness _____

Form 16 • Consent to dental operation, anesthetics, and other dental services

A.M.
Date_____ Time_____P.M.

1. I authorize the performance upon _____ of the
(myself or name of patient)

following dental operation _____
(state nature and extent of operation)

to be performed under the direction of Dr._____.

2. I consent to the performance of operations and procedures in addition to or different from those now contemplated, whether or not arising from presently unforeseen conditions, which the above-named doctor or his associates or assistants may consider necessary or advisable in the course of the operation.

3. I consent to the administration of such anesthetics as may be considered necessary or advisable by the dentist responsible for this service, with the exception of _____ _____.
(state "none," "spinal anesthesia," etc.)

4. I consent to the photographing or televising of the operations or procedures to be performed, including appropriate portions of my body, for dental, scientific or educational purposes, provided my identity is not revealed by the pictures or by descriptive texts accompanying them.

5. For the purpose of advancing dental education, I consent to the admittance of observers to the operating room.

6. I consent to the disposal by hospital authorities of any tissues, teeth or parts which may be removed.

7. The nature and purpose of the operation, possible alternative methods of treatment, the risks involved, and the possibility of complications have been fully explained to me. No guarantee or assurance has been given by anyone as to the results that may be obtained.

(Cross out any paragraphs above which do not apply.)

Signed _____
(Patient or person authorized to consent for patient)

Witness _____

Form 17 • Consent to oral surgery for cosmetic purposes

Date_____ Time_____ A.M. P.M.

1. I authorize Dr._____ to perform oral surgery upon me for the purpose of attempting to improve my appearance with respect to the following condition:

_____

_____

2. The nature and effect of the operation to be performed, risks involved, as well as possible alternative methods of treatment, have been fully explained to me.

3. I also authorize the operating dental surgeon to perform any other procedures which he may deem desirable in attempting to improve the condition stated in paragraph 1 or any unhealthy or unforeseen condition that he may encounter during the operation.

4. I consent to the administration of anesthetics to be applied by or under the direction of Dr._____, and to the use of such anesthetics as he may deem advisable.

5. I know that the practice of oral surgery is not an exact science and that therefore reputable practitioners cannot guarantee results. No guarantee or assurance has been given by anyone as to the results that may be obtained.

Signed _____
(Patient or person authorized to consent for patient)

Witness _____

Form 25 • Consent to treatment

Date_____ Time_____ A.M. P.M.

I have been fully informed by Dr._____ of the risks, possible alternative methods of treatment, and possible consequences involved in treatment by means of

_____

_____

_____

for the relief of _____. Nevertheless, I authorize Dr._____ to administer such treatment to me.

Signed _____
(Patient or person authorized to consent for patient)

Witness _____

Form 26 • Acknowledgment of emergency treatment

Date_____ Time_____ A.M. P.M.

I acknowledge that the dental care which (was) (is about to be) furnished to _____ (name of patient) by Dr._____ (was) (will be) limited solely to emergency treatment. I understand that it will be necessary to select another dentist and make immediate arrangements with him for a complete diagnosis and continuation of treatment.

(Cross out inappropriate words)

Signed _____
(Patient or person authorized to consent for patient)

Witness _____

Form 27 • Refusal to submit to treatment

Date_____ Time_____ A.M. P.M.

I have been advised by Dr._____ that it is necessary for me to undergo the following treatment: _____
(Describe operation or treatment)

The effect and nature of this treatment have been explained to me.

Although my failure to follow the advice I have received may seriously imperil my health,

I nevertheless refuse to submit to the recommended treatment. I assume the risks and consequences involved and release the above-named dentist from any liability.

Signed _____

Witness _____

Form 28 • Consent to experimental procedure or treatment

Date_____ Time_____ A.M. P.M.

I authorize the performance upon _____ of the following
(myself or name of patient)

procedure or treatment: _____.
(State nature of procedure or treatment.)

The nature and purpose of the procedure or treatment, possible alternative methods of treatment, the risks involved, and the possibilities of complications have been explained to me. I fully understand that the procedure or treatment to be performed is experimental and unproven by dental experience, and that the consequences are unpredictable.

Signed _____
(Patient or person authorized to consent for patient)

Witness _____

Form 29 • Authorization for treatment with drug under clinical investigation

Date_____ Time_____ A.M. P.M.

I authorize Dr._____, to treat _____
(name of patient)

with the drug presently identified as _____ for the following condition: _____

_____.
(Describe symptoms of disease to be treated)

It has been explained to me that the safety and usefulness of the drug in the treatment of patients for the above condition are now being investigated and that the manufacturer or distributor has supplied the drug for the purpose of providing further evidence of its safety and usefulness. I voluntarily consent to treatment with the drug and release Dr._____ _____ from liability for any results that may occur.

Signed _____
(Patient or person authorized to consent for patient)

Witness _____

Form 33 • Consent to diagnostic procedure

Date_____ Time_____ A.M. P.M.

I authorize Dr._____, and such assistants as he may designate, to perform upon _____ the following diagnostic procedure:
(myself or name of patient)

_____.

The nature of this procedure, possible alternative methods of diagnosis and the risks of injury despite precautions have been explained to me.

Signed _____
(Patient or person authorized to consent for patient)

*Assistant secretary, Council on Legislation.

1. This booklet is obtainable from the American Medical Association, 535 North Dearborn Street, Chicago 10, at the cost of $1.

Additions to the Library

BUREAU OF LIBRARY AND INDEXING SERVICE

The books listed here have been added recently to the Bureau collection. Requests for this material, available on loan to all members of the Association, should be addressed to the Bureau of Library and Indexing Service. There is no charge for borrowing books, but there is a minimal charge of one dollar ($1.00) for each package library. Illinois residents add 4 per cent Retailers Use Tax. (This applies also to the purchase of books.) Practically all the dental journals published in the world at present are available to members on loan. Lists of books, package libraries and journals are available on request.

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PERIODICALS

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BULLETIN OF THE LOS ANGELES DENTAL SOCIETY, (Los Angeles)

LINCOLN DISTRICT DENTAL SOCIETY NEWS LETTER, (Lincoln, Nebr.)

MALAYAN DENTAL JOURNAL, (Singapore)

PANAMA CANAL ZONE DENTAL SOCIETY NEWS LETTER, (Balboa)

REVISTA DE LA ASOCIACIÓN DENTAL DE PUERTO RICO, (Caparra Heights)

Association staff members: your national servants

Donald H. Rowcliffe, Jr.

BUSINESS MANAGER

Donald H. Rowcliffe, Jr., was appointed business manager of the Association in 1961. The business manager's office is responsible for the business and fiscal affairs of the Association, and operates under the direct supervision of the Association secretary. Activities of the office include the compilation of the Association's annual budget, the maintenance of the books and records of account and the issuance of financial reports, the securing of contracts and making of physical arrangements for the annual sessions, sales promotion, purchase of supplies and equipment, arrangements for travel by Association officials and staff members, and supervision of such services as building maintenance, personnel, reception, mail and shipping, Mimeographing and related activities.

Mr. Rowcliffe was graduated from Aurora College, Aurora, Ill., with the degree of B.S. in business administration. He has served as instructor in accounting at Aurora College, and has lectured on accounting at Northwestern University. He is a certified public accountant in Illinois (1952) and holds membership in the American Institute of Certified Public Accountants, the Illinois Society of Certified Public Accountants and the National Society for Business Budgeting.

Mr. Rowcliffe served as a naval aviator in World War II. He holds a commercial pilot's license and flies occasionally for pleasure.

Formerly he was assistant general controller of the Illinois Agricultural Association and affiliated companies.

Robert W. Newport

ASSISTANT BUSINESS MANAGER

Robert W. Newport became assistant business manager of the Association in 1959. His chief responsibilities include personnel, office supply and equipment purchasing, shipping, building maintenance, Mimeograph, reception and mail.

Mr. Newport received a bachelor's degree in psychology from DePaul University, Chicago, and took graduate work on a master's degree in industrial relations at Loyola University.

He taught eighth grade for one year, and coached basketball, track and softball teams. He worked for five and one half years for Bankers Life and Casualty Company, moving from personnel interviewer to personnel director, in which position he directed a personnel program for 2,400 employees engaged in the accident and health insurance business.

Mr. Newport served with the U.S. Army infantry from 1950 to 1953, and was a platoon leader with the infantry in Korea.

book reviews

THE PRACTICE OF PERIODONTIA (ORAL MEDICINE)

By Sidney Sorrin, D.D.S. 496 pages with recommended reading lists. Index. $19.50. New York, The Blakiston Division, McGraw-Hill Book Company, Inc., 1960.

This excellent textbook was composed with the cooperation of over 40 contributors, who are members of the faculty of the department of periodontia and oral medicine, New York University College of Dentistry.

The book is well organized, written and edited for its intended purpose of bringing to the undergraduate and general practitioner the art and science of the practice of periodontics.

Throughout the text's 16 chapters, it is so profusely illustrated that hardly a page appears without a picture explanation or image correlation.

Since the practice of periodontics is based on the knowledge of the underlying tissues in health and disease it is natural that chapter I, "The application of anatomy, histology and physiology to periodontia," is so dominantly presented.

There are 78 pages in chapter 9, "Occlusal equilibration, habits and food impactions." Here the interrelationship of occlusion and the periodontal structures are discussed and then knowledgeably summarized.

Other outstanding chapters of interest include "Diet and nutrition," "Significant oral lesions," and "Cases before and after treatment." Here the correlation between the practice of periodontics and oral medicine becomes obvious.

With the excellent recommended reading list appearing at the end of each chapter the entire book becomes a valuable text and reference designed to furnish a sound and intelligent basis on which the practice of periodontics is so dependent. *E. A. Archer*

REVIEW OF DENTISTRY— QUESTIONS AND ANSWERS

By Maynard K. Hine, D.D.S., M.S. Third edition. 576 pages. Index. Price $9. St. Louis, C. V. Mosby Co., 1961.

Because of the untimely death of Dr. James T. Ginn who edited the first two editions of this textbook, Dr. Hines assumed the editorship of this edition. The book is an excellent review of the entire field of dentistry, including the basic sciences. Aside from the editor, the book is the work of 29 collaborators. Most of the original contributors again agreed to participate in this edition. The book has been thoroughly revised and rewritten to reflect the more important advances in knowledge of the subjects covered. A remarkable amount of fine material has been compressed into this volume.

Each chapter is written by a recognized authority in his special field of knowledge. Every chapter has been reviewed by at least three individuals, so that the material is authoritative and is representative of current opinion. Since no attempt has been made to ascertain that all contributors present identical viewpoints, different opinions on many controversial issues are reflected in this book. The four common types of examination questions are amply represented in this work.

In this reviewer's opinion this is the most complete text of its kind available. It is an excellent example of current dental thinking at its best. *Review of Dentistry* is presented in a question and answer form, primarily as a guide for those preparing for State and National Board Examinations, but serves equally as well as a general review for the undergraduate student, and as a handbook for the practitioner.

Dr. Hine and the publisher are to be heartily congratulated for making this splendid textbook available.

E. Alan Lieban

CERAMICS

By P. William Lee. 210 pages with 20 illustrations and 59 tables. Index. $5.95. New York, Reinhold Publishing Corporation, 1961.

This book, as stated in the preface, is a survey of the ceramics industry. It is of particular interest because the author is a consultant to one of the largest dental porcelain manufacturing companies and is well known to dental ceramists.

Two chapters have direct application to procedures carried out in the dental field. These are the manufacture and physical properties of dental porcelain and its application to the fabrication of denture teeth, and the use of enamels for application to metals.

In an area which is gaining impetus, particularly because of the introduction of the porcelain-fused-to-metal combinations, this book provides valuable background data on the physical and chemical properties of various ceramic materials which may eventually find their way into dentistry.

The book is highly recommended to the dentist and research worker interested in the development of ceramic materials, as a concise, well-indexed reference to the whole subject.

John F. Johnston and George Mumford

THE EVOLUTION OF DENTAL EDUCATION

By John E. Gurley. 276 pages. Index. St. Louis, American College of Dentists, 1960.

Anyone who is at all familiar with the experience and the writing style of Dr. Gurley, as well as his meticulous attention to detail, will know in advance that this book on the "evolution of dental education" will be a valuable library addition. The book, of course, is not a history of the profession, but instead gives a substantial thumbnail sketch of the background of dental education, listing the persons who made significant contributions to it prior to the instigation of the old Dental Educational Council of America. The major part of this book describes the objectives and the activities of the Dental Educational Council of America, thereby taking the history of dental education up to about 1940, with very little attention to the successor of that agency or to the work in education since 1940.

This book is extremely interesting and useful, in that Dr. Gurley has done a great deal of library research in seeking out statements of educational leaders which he considers to be significant clues to their philosophies of education. All of the material is well documented and should provide both practitioners and educators with a wealth of reference material. It remains for someone else to contribute another volume which will include much of the material that Dr. Harlan Horner included in his 1947 publication, *Dental Education Today*, and bring the profession up-to-date on what is now happening in the field of dental education—the backbone and foundation of dental practice—and the crystal ball for the profession's future. *Shailer Peterson*

ALLGEMEINE PATHOLOGIE: GRUNDLAGEN UND PROBLEME, EIN LEHRBUCH (GENERAL PATHOLOGY: PRINCIPLES AND PROBLEMS, A TEXTBOOK)

By Erich Letterer, M.D. 849 pages with 632 illustrations. Index. DM. 69. Stuttgart, Georg Thieme, 1959.

Intended for dental and medical practitioners as well as for students, this textbook on general pathology emphasizes the relations between pathologic findings and clinical practice. An interesting feature is the manner in which systemic diseases are presented comprehensively, rather than by describing the pathologic changes occurring in specific organs and sites separately. The logical organization of the chapters is extremely helpful for the reader looking for information on cause and effect of a specific disease.

The author, the director of the Pathological Institute of the University of Tübingen, Germany, has written a careful, well-balanced and accurate textbook in which controversial subjects have not been avoided. Because of his training as a pathologist, he quite naturally emphasized the developmental aspects of disease from the anatomic point of view. He has been particularly skillful in separating facts from theory.

For the dental practitioner the following chapters are of great interest: "A Preliminary Discourse of General Pathology"; "Morphology"; "Metabolism"; "Circulation"; "Growth and Development"; "Reactions to Stimuli," and "Motility and its Disturbances."

The criticisms that must be directed toward this book are those which are valid for any new, single-authored textbook on pathology. It seems impossible for one man, however experienced and learned he may be, to keep up with all facets of pathology and with the rapid advances in the field. In this book there appears a certain unevenness in the handling of various topics, which seems to be inevitable when one author attempts to develop a unified concept

of pathology in such a detailed manner. Despite these minor criticisms it is worthy of praise that so busy and productive a pathologist has been able to produce a textbook of undeniable quality.

Most of the illustrations are of high quality, and so are binding, printing and paper. This textbook can be recommended as an authoritative source of reference on pathology.

Paul H. Glucksman

LABORATORY MANUAL OF MEDICAL MICROBIOLOGY

By Janet B. Gunnison. 243 pages. Index. $3.50. Palo Alto, N. P. Publications, 1960.

This manual is divided into 34 sections covering the various subjects in microbiology. One section of nine pages is devoted to dental microbiology. An additional section on the subject of Vincent's disease is present among the infections. Each section contains considerable discussion in paragraph style on the groups of experiments for each subject and at least one blank page is provided for filling in the results obtained. Unfortunately this fairly adequate book is poorly bound with a glue and cloth backing which showed a tendency to separate.

Sol Haberman

THEORY AND PRACTICE OF CROWN AND BRIDGE PROSTHODONTICS

By Stanley D. Tylman, D.D.S., M.S., and Stanley G. Tylman, D.D.S. Fourth edition. 1,063 pages with 1,474 illustrations and 11 color plates. Index. $17.50. St. Louis, C. V. Mosby Co., 1960.

Twenty years have passed since the first edition of Dr. Tylman's book was published. Then as now, this book was written to serve as a textbook for the student, and as a reference book for the practitioner. This aim has been fulfilled.

The many advances in technical procedures and research in the biological fields relating to dentistry have progressed at such a phenomenal rate that it is necessary to evaluate present-day practices, materials, and research data periodically—thus the fourth edition of Tylman's *Theory and Practice of Crown and Bridge Prosthodontics.*

The recent thinking and evidence on the uses, advantages, disadvantages, and limitations of newer methods, materials and theories as reported in the literature have been added to this book. However, those fundamental principles and methods that have been proved sound, both biologically and mechanically, have been retained.

The chapter on the evaluation and technics of high-speed tooth-cutting equipment is new. Also, the new chapter on the use of Mercaptan and silicone base impression materials is a welcome addition to this volume.

This textbook is encyclopedic, covering almost every conceivable aspect of crown and bridge prosthodontics. The illustrations are superb, it is well-indexed, and certainly can serve as a fine reference work.

Marvin Sniderman

DEUTSCHER ZAHNÄRZTE KALENDER 1960 (ALMANAC FOR GERMAN DENTISTS 1960)

Edited by Ewald Harndt. Nineteenth edition. 350 pages with 203 illustrations. DM. 16.80. Munich, Carl Hanser, 1960.

A concise dental almanac, excellently written and organized, the 1960 edition contains articles written by 18 German dentists (mainly dental educators or specialists). Although some of their contributions, at least in their essential parts, have appeared in the dental literature, the book presents an excellent view of present-day European dentistry, especially German dentistry, dealing with each dental specialty separately and competently.

As were the previous editions, the 1960 edition again is informative and although it is designed mainly for German dental practitioners, American readers will find the following articles interesting and stimulating: (1) "Indication for and Technic of Implant Dentures," by Horst Uhlig; (2) "Surface Formation of Complete Dentures," by Anton Hromatka; (3) "Secondary Caries," by Th. Spreter von Kreudenstein; (4) "Removal of Crowns, Bridges and Root Canal Anchorages Without Extraction of Abutment Teeth," by Eberhart Reumuth; (5) "Oral Hygiene: Patient and Dentist," by Karl Eichner; (6) "Removable Splints for Tooth Stabilization," by Axel Westphal; (7) "Premature Loss of Deciduous Teeth: Cause and Prevention," by H. Schimmler; (8) "Extraoral Roentgenography," by Werner Hielscher; (9) "Diseases of the Salivary Glands," by Hermann Mathos; (10) "The Most Important Clinical Syndromes; A Classification According to their Dental and Oral Manifestations," by Gottfried Schneider; (11) "Relations Between Biology and Dentistry," by Otto Steiner, and (12) "Diseases of the Mouth and the Teeth in Domesticated Animals," by E. Becker.

Attractive in appearance, skillfully edited, printed and illustrated, the 1960 dental almanac can be recommended to dental practitioners, educators and students who master the German language and are interested in the recent developments in Germany dentistry and dental research. *Paul H. Glucksman*

ANATOMY AND PHYSIOLOGY OF SPEECH

By Harold M. Kaplan, Ph.D., New York, McGraw Hill Book Co., Inc., 1960.

This is an excellent book for students and teachers who are interested in phonetics and speech production. It is broad in scope and thorough, yet concise and clear. It presents the subject from the standpoint of several biologic disciplines which are masterfully integrated. Throughout the entire book the author, an outstanding authority in physiology and biology, is ever mindful of correlating and, whenever possible, integrating structure and function of all the organs that participate in sound and speech production. This is precisely the kind of approach that should be welcomed by the medical and dental professions, speech therapists and all those that are interested in the oro-naso-laryngo-pharyngeal structures in health and disease. This book is also of particular interest to those who are engaged directly or indirectly in cleft palate rehabilitation.

The contents are excellently organized and interestingly presented. It is a very readable book, comprehensive in its treatment. Much light is shed on many areas in speech production mechanisms not understood very well previously.

Professor Kaplan has given us a most valuable addition to the literature on health services. *Joseph S. Landa*

CLINICAL PERIODONTOLOGY

By Abraham Berliner. D.M.D. 180 pages with 38 tables. Recommended additional reading. Index. New York City, Park Press, 1960.

This monograph, the first of a series, is divided in four sections. Section I is concerned with the philosophy and approach to a comprehensive examination, both medical and dental. Section II is devoted to the clinical oral examination. Section III deals at length with the medical and laboratory investigation. Section IV discusses the treatment planning.

Although the sequence in the presentation of the material is well organized and logically arranged, the title of the monograph is a little misleading. The material is presented in terms more of a medical than a dental examination. A great deal of attention is focused on the medical history and laboratory tests neglecting important information in the oral examination and actual treatment planning. An excessive number of tables for the size of the book illustrates the different aspects of blood analysis and blood chemistry, urinalysis, basal metabolism, diet and disturbances in mineral metabolism.

The presentation of strictly periodontal problems is almost absent. The reviewer hopes that future publications will justify the title.

The book is pocket size, well bound, without illustrations. The style of presentation is simple, clear and compact. *Martin Cattoni*

POSITIVE HEALTH OF OLDER PEOPLE

Edited by Betsy Marden Silverman. 131 pages. Index. $2.25. New York, The National Health Council, 1960.

This volume contains a summary of presentations at the eighth annual National Health Forum sponsored by the National Health Council. The forum was attended by 600 participants interested in the health of older people. The major areas of discussion concerned physical aging, mental and emotional health, and stimulating local cooperative action. Dentists attending the forum emphasized the importance of periodontal disease and poor nutrition as contributing factors to the physical decline of older persons. The difficulties of treating bedridden older people in the nursing home, hospital and private home could be lessened by the ready availability of portable dental equipment.

Donald E. Flieder

PHYSIKALISCHE THERAPIE IN DER STOMATOLOGIE (PHYSICAL THERAPY IN DENTISTRY)

By Karl Jarmer. 232 pages with 85 illustrations. Index. DM. 30.50. Berlin, Volk und Gesundheit, 1960.

Over half of this book is devoted to the basic physics and biophysics of hydrotherapy, balneology, diathermy and irradiation with roentgen or radium rays. The well-described principles of physical therapy are as applicable to dental practice in the United States as they are in

Germany and other European countries. The use of German terminology, however, may trouble the American reader.

The text provides good descriptions of the technics of dental application of physical therapy, and contains appropriate recommendations in regard to indications, contraindications and safeguards. The chapter on physical therapy in the field of oral surgery, however, is too brief.

The book is recommended for use by any dental practitioner interested in physical therapy. It should be of special value in dental education where this subject seems to be neglected. The bibliography, subject index and list of scientific terms used afford a complete review of physical therapy used in European dentistry. One of the many outstanding features of this book is the use of line drawings which profusely illustrate the text. For the dental practitioner who is familiar enough with the German language to be able to read this book without frequent recourse to a dictionary, the unique work can be recommended unreservedly.

Paul H. Glucksman

DENTAL CLINICS OF NORTH AMERICA

July 1960 issue. Three issues published yearly. March, July and November. Total price $14 yearly subscription. Philadelphia, W. B. Saunders Co., 1960.

SYMPOSIUM ON MINIMIZING PROSTHODONTIC FAILURES

By S. Howard Payne, consulting editor in collaboration with 9 co-authors. 149 pages with some illustrations. Index.

This symposium was conceived primarily to enhance the clinical judgment of the prosthodontist, who is called on frequently to decide what is to be done about a patient's dental problems, and then to integrate the various steps through to completion.

Doctor Payne has edited a fact-packed and stimulating text that should be of great value to anyone practicing prosthodontics. Ten authors have collaborated on the writing of this text. The authoritative participants are all men of wide experience. The individual authors have expressed their thoughts and methods in practical discussions of ten important phases of prosthodontics. The scope is broad and presents a rapid source of information for the busy practitioner. It is outstanding for its timely, clear and informal exposition of our present concept of the subject. A comprehensive bibliography further enhances its value.

Anyone interested in prosthodontic failures cannot afford to be without this information. In fact, this book easily could become a standard reference work. It is for the foregoing reasons and for the general high tone of excellence that this work may be recommended highly to those for whom it was written.

E. Alan Lieban

TROPEN-ERFAHRUNGEN IN PLASTISCHER GESICHTS-UND KIEFER-CHIRURGIE (TROPICAL EXPERIENCE WITH PLASTIC SURGERY IN THE MAXILLOFACIAL REGION)

By Wolfgang Bethmann. 212 pages with 167 illustrations. Index. DM. 43.10. Berlin, Volk und Gesundheit, 1960.

The author, who served as an oral surgeon in Vietnam, has recorded his experiences, especially in regard to plastic repair of maxillofacial defects, in an accurate, concise, practical and logical manner. The entire field of oral surgery is well covered. A few remarks concerning what can and cannot be achieved in the tropic regions will be useful to the dental student or practitioner who wants to join the staff of a dental clinic in the tropical zone. The book represents a pioneer study of the sociologic and psychologic factors inherent to dentistry in this region.

This interesting volume deserves careful reading and special interest by dental educators and members of the profession. The illustrations are well selected and so is the relatively complete bibliography. The book, therefore, appears to be a distinct contribution to the dental literature. The pleasure of reading it is greatly enhanced by the good taste exhibited by the publishers.

Paul H. Glucksman

current literature

THE USE OF INTRAMUSCULAR PERPHENAZINE TO CONTROL POSTOPERATIVE VOMITING

By Berton E. Braly and Daniel C. Moore. Am.J.Surg. 102:120 July 1961.

Perphenazine (0.75 cc. or 3.75 mg.) was injected intramuscularly on going to surgery, on return from surgery, and every six hours thereafter for a total of four doses, in 2,794 patients for the control of postoperative vomiting. All surgical patients who were to receive an anesthetic were included, except children under 12 years old, regardless of the type of surgery, anesthesia or premedication.

Vomiting was defined as emesis of any material which measured 50 cc. or more in volume. Of the 2,794 patients, 145 (5.2 per cent) vomited during the time they were receiving perphenazine. This compares favorably with the incidence of vomiting in a series with perphenazine of a previously conducted double-blind study (1958) in which the incidence was 6.2 per cent. Perphenazine appears to exceed in antiemetic potency dimenhydrinate, cyclizine lactate, chlorpromazine and prochlorperazine.

It was the clinical impression that hypotension in the immediate postoperative period (one to six hours) seemed to occur more frequently with perphenazine than is normally encountered. Prolonged recovery time in a few patients seemed to be attributable to the combination of the anesthetic agent and the perphenazine. There were four instances of dystonia.

Perphenazine can be used routinely in patients undergoing surgery, as an extraordinarily effective antiemetic. The greatest danger in the use of perphenazine routinely may lie in its remarkable antiemetic potency. It is conceivable that the detection of serious postoperative complications might be obscured by suppression of emesis.

TUBERCULOSIS OF THE ORAL CAVITY

By R. Gromotka and S. Witte. Deut.med.-Wschr. 86:1398 July 21, 1961.

Tuberculosis, caused by *Mycobacterium tuberculosis*, may affect any organ or tissue of the human body. Exudative and proliferative forms of the disease occur in the oral cavity, and may be classified according to the sites in which tubercle formation appears.

Tuberculosis of the oral mucosa is rarely encountered in dental practice. However, three clinical types are known to occur, and must be differentiated diagnostically. Lupus vulgaris, a true tuberculosis of the skin, may extend to the maxillofacial region. This slowly developing, scarring and deforming form of tuberculosis sometimes involves the oral mucosa and forms characteristic jellied nodules on the mucous membranes of the cheek, palate, pharynx and the lips, without active ulceration. Miliary tuberculosis, characterized by formation of numerous lesions the size of a millet seed, is blood borne and appears at the same sites in the mouth as those favored by lupus vulgaris. Ulcerative tuberculosis involving the oral mucosa may involve any part of the oral cavity and begins simultaneously at different points. This disease form is always secondary to tuberculosis of the lungs.

Tuberculosis of the tongue also is rare. The existence of primary tuberculosis of the tongue often has been questioned. The infection follows a break in the continuity of the mucous membrane of the tongue, permitting the causative microorganisms to enter. The tongues of male patients seem to be more prone to this disease form; children are seldom affected.

Tuberculosis of the jaws, as all other forms of tuberculosis of bones, always is secondary to tuberculous lesions occurring at other sites in the human body. The disease usually occurs as an infection of the epiphysis of the lower jaw, hardly ever involving the temporomandibular

joint. In the upper jaw, the presence of *M. tuberculosis*, carried by the blood stream, causes a chronic osteomyelitis. The bacilli and their toxins produce irritation leading to the formation of miliary tubercles consisting of a mass of granulation tissue infiltrated by endothelial cells and lymphocytes. Later the fibroblastic tissue of the walls of the tubercles changes to mature connective tissue. Sometimes, reformation of tissue prevents to a certain degree further extension of the tuberculous process. Tuberculosis of the upper jaw and that of the lower jaw run different clinical courses. In the lower jaw, the disease is extremely aggressive, whereas in the upper jaw the progress is relatively slow. Because secondary infection occurs early in tuberculosis of the jaws, it is often difficult to demonstrate diagnostically that the disease actually is tuberculosis. Only if secondary involvement of the salivary glands is present is the evidence fairly conclusive. Microscopic examinations of specimens taken from parts of the jaws where nodules appeared often fail to provide conclusive evidence.

Tuberculosis of the salivary glands, at least in its primary form, seldom occurs. Usually a contained lymph gland is involved primarily, and the salivary gland secondarily. The tuberculous swellings are diffuse, develop slowly, and cause neither pain nor subjective symptoms. The diagnosis can be made only after confirming histopathologic examinations. The objective symptoms simulate those of secondary syphilis and tertiary syphilis or actinomycosis.

Tuberculosis of the tooth pulp is rare, but the possibility of an entrance of *M. tuberculosis* causing pulmonary tuberculosis through a carious cavity has been demonstrated by several investigators. There were instances reported in which tuberculosis of the pulp followed an infection of the apex of a root involving also the periodontal membrane. The presence of the causative organism in the saliva, however, hardly ever causes tuberculosis of the pulp.

Tuberculosis associated with odontogenic infections is manifested by the occurrence of abscesses that resist all treatment procedures. Those oral abscesses always should be suspected of having a tuberculous origin and should be checked by histologic examinations. The presence of a tubercular abscess associated with an odontogenic infection requires immediate physical examination of the patient and a roentgenographic examination of his chest. Children and adolescents are more frequently affected by this form of tuberculosis than are adults. Some of the patients show evidence of pulmonary tuberculosis, whereas in others only the oral tuberculous lesions are demonstrable. Odontogenic cysts may be associated with tuberculous lymphadenitis.

Tuberculosis of the oral cavity may be manifested by secondary occurrence of chronic periostitis, and by other tuberculous lesions which do not present specific pathognomonic clinical characteristics. The variability in appearance renders clinical recognition of most tuberculous lesions in the mouth difficult, and only by means of biopsy examination is it possible to differentiate tuberculosis of the oral cavity from primary syphilis, simple hyperplasia or carcinoma. All types of tuberculous lesions in the mouth may be discovered first by the dentist before the presence of the primary pulmonary condition has become of sufficient concern to the patient to seek advice from the physician.

Although tuberculous lesions in the oral cavity are rare, the diagnostic examination must be thorough, because negative findings by direct microscopic examination are often inconclusive and have to be supplemented by inoculation tests performed with animals (mainly guinea pigs).

The occurrence of suspicious—although benign—lesions in the oral cavity may create in patients the belief that they are affected with tuberculosis; this is a phobia termed "tuberculomania" which should be recognized by dentists and physicians. To counteract tuberculomania, the dentist should explain, that although many patients at some time in their lives become infected with *M. tuberculosis*, comparatively few will develop the active disease because in the great majority of instances, the defensive forces of the human body are able to resist the bacilli. Tuberculous foci in the mouth often heal spontaneously or are held in check to such an extent that no systemic evidence is produced. Even in instances in which the presence of the active disease has been established, the defensive forces of the human body can overcome tuberculous infection and render it harmless. Latent and arrested foci of a tuberculous infection of the mouth may containing living tuberculous bacilli that can exert an activity only when the resistive forces of the body are weakened. Many persons possess considerable inherent resistance to tuberculosis, but none a complete immunity. All scientific attempts to produce an artificial immunity in man against tuberculosis have met with little success.

Dentists must recognize the symptoms and signs of tuberculosis of the oral cavity, so that they may refer such patients to their physician for early treatment. Unrecognized instances of tuberculosis could then be controlled before the patients reach a hopeless stage.

Dentists also should understand the mechanism of transmission of tuberculosis, especially

pulmonary tuberculosis, to prevent the danger of the disease being transmitted from patient to patient and from patient to the dentist or his personnel. They should be aware that oral tuberculous lesions may represent a secondary manifestation of a far-advanced pulmonary infection which may have an unfavorable prognosis.

VARIATIONS IN THE MORPHOLOGY OF MANDIBULAR FIRST MOLARS OF ALBINO RATS

By Leif B. Johannessen. J.D.Res. 40:812 July-Aug. 1961.

Studies of dental caries in man and in rats suggest a relation between this disease and the shape and size of certain teeth. This study was undertaken to establish the normal range of variation in the size and shape of the mandibular first molars of albino rats.

Measurement of the mandibular first molars of 216 albino rats showed that the maximal mesiodistal crown size was larger in male than in female rats. The mesiodistal dimension at the cervical level was similar for the molars of both sexes; therefore, the molars of male rats had a greater bulging of the proximal surfaces of the crowns of the molars. No sex differences in the mesial, central and distal internal crown heights were observed.

The crowns of mandibular first molars were fully formed when the rats were about ten days old. The sex difference expressed in the maximal mesiodistal tooth size thus was established much earlier than sex differences in the craniofacial skeleton, which did not become apparent until the animals were about two months old.

The correlation was high between maximal mesiodistal and buccolingual crown size. Moderate, but statistically significant, correlation was observed between the mesial and distal, central and distal, and mesial and central internal crown heights.

As a result of tooth wear, a statistically significant widening of the occlusal opening of the mesial groove and a narrowing of the distal groove took place between 41 and 61 days of age. The latter dimension continued to decrease at a rapid rate from 61 to 91 days, and the occlusal aspect of the central groove also became considerably narrower during this period. There was a decrease of 0.13 mm. in external mesial crown height in both male and female rats between 41 and 91 days old.

The strain of rats used in this investigation has been inbred for many generations, and the animals had an opportunity for comparable nutrition during and after tooth development. Although food debris was found in all occlusal grooves of the molars, no carious lesions were observed.

The wide range of normal variation in the size and shape of rat molars, the early age when the crown morphology is established, and the pronounced occlusal changes caused by wear, must be considered when studying the effects of nutrition, endocrine and other factors on tooth morphology and the possible relation between the size and health of teeth.

THE SIALIC ACID CONTENT OF HUMAN SALIVA

By I. Zipkin, S. E. Mergenhagen and R. Kass. Biochem. & Biophys. Res. Comm. 4:76 1961.

There have been no reports in the literature to date to demonstrate the presence of sialic acid in either whole or parotid human saliva, despite the well-documented presence of this class of compounds in the salivary glands.

Samples of parotid saliva were obtained from 18 persons. The thiobarbituric acid procedure of Warren (1959) demonstrated that the mean sialic acid content of parotid saliva of normal young adults was 2.4 mg. per cent, and of whole saliva, 4.7 mg. per cent.

In subjects with periodontal disease, the mean sialic acid content of parotid saliva was 1.9 mg. per cent, and of whole saliva, 4.0 mg. per cent. In subjects with rheumatoid arthritis, the mean sialic acid content of parotid saliva was 3.5 mg. per cent, and of whole saliva, 5.3 mg. per cent.

The concentration of sialic acids was appreciably greater in mixed whole saliva than in parotid saliva from the same person. This may be attributed to its presence in oral bacteria, in secretions of the other salivary glands, and in oral epithelial debris.

DENTAL RESEARCH AT THE NATIONAL INSTITUTES OF HEALTH

By Seymour J. Kreshover. J.Am.D.Hyg.A. 35:106 July 1961.

Congress in 1948 enacted legislation which established the National Institute of Dental Research, with H. Trendley Dean as its director. Thereafter, a rapid expansion began until today, under the direction of Francis A. Arnold, Jr., the institute is one of the world's largest centers devoted to dental research.

The over-all program is divided into three broad categories, namely: laboratory and clin-

ical research at Bethesda, Md.; support by grants-in-aid of research projects in colleges, universities and other nonfederal institutions, and activities designed to expand the nation's resource of dental research scientists. Organizationally, the institute's direct research operations are mediated through five major departments (called laboratories or branches). Staffed by almost 50 principal investigators and about 75 supporting technical staff members, these departments cover a wide range of research activity as reflected by such titles as biochemistry, microbiology, epidemiology, histopathology and clinical investigations. Secondary or subdepartmental units have been established in most of these major laboratories to take responsibility for such specialized activities as human genetics, enzyme chemistry and gnotobiotics.

The program of research at the National Institute of Dental Research is concerned not only with the cause and control of dental caries, periodontal disease and other disturbances and abnormal conditions of the mouth and adjacent structures, but with the gathering of information and knowledge in a variety of basic fields that are not necessarily disease oriented, as for example, a better understanding of the mechanisms of calcification, protein chemistry, and so forth. This broad scope of responsibility is a far cry from the modest beginning of dental research in the United States Public Health Service in 1931 when the dental hygiene unit consisted of a single dental officer, Dr. Dean; its primary function then was to apply principles of epidemiology to a series of community studies on mottled enamel; from this came a full-scale epidemiological program designed to document the effectiveness of fluoridation as a caries control measure.

In the epidemiological area today, emphasis is being placed on patterns of prevalence and severity of periodontal disease and dental caries related to age, sex and social and economic status, and an evaluation of related biochemical and nutritional factors. One study has been concerned with gathering dental information as a part of world nutrition surveys. Findings to date have been summarized as follows:

"Lowered caries prevalence in Ecuadorian adults was related to optimal or high intakes of fluoride. Both high and low levels of caries experience were seen in Eskimos in Alaska with high intakes of animal protein, moderate intakes of fat, and very low intakes of carbohydrates, with generally low plasma levels of vitamin A. Caries prevalence levels as low or lower were seen in Ethiopians on a comparatively low-protein, high-carbohydrate cereal diet, high in thiamine; and in Vietnamese on a diet in which highly milled rice was the staple cereal, yielding only marginal amounts of thiamine and riboflavin. Large proportions of individuals in each group had remained caries free from birth to the time of examination.

"If caries prevalence levels were generally low by U.S. standards, the prevalence and severity of periodontal disease were correspondingly high. The only areas where periodontal disease was importantly less prevalent than in the United States were found in Alaska, in men whose thiamine excretion was somewhat higher, and whose levels of plasma vitamin A were somewhat lower than those for other men in that study; and in the primitive Jivaro Indians examined in Ecuador. Elsewhere in Alaska, and generally in Peru, disease levels were comparable with those seen in the United States, among people of low socioeconomic status. In Ethiopia, Ecuador and Vietnam, prevalence levels were much above any so far recorded for the continental United States."

ISOLATED PALATAL PARALYSIS

By Richard W. Olmsted and John A. Kirkpatrick. Cleft Palate Bul. 11:55 July 1961.

At the cleft palate clinic of St. Christopher's Hospital for Children, Philadelphia, three children were studied in whom defects of speech similar to those associated with palatal clefts were caused by paralysis of the palate. The paralysis was not associated with other obvious neuromuscular weakness, and the condition has been termed "isolated palatal paralysis"; presumably it is of congenital origin.

Initial signs of the palatal paralysis were manifested in all three patients shortly after birth, by regurgitation of milk through the nares during feeding. The second manifestation appeared with onset of speech which was hypernasal and unintelligible. When first examined at the clinic, the children were 11, 11 and 13 years old.

Two of the palates were of normal configuration and one was slightly foreshortened. Motion of the palate during phonation was absent in one patient and minimal in two. In all patients the range of movement was inadequate to effect a contact of the palate with the pharyngeal wall.

Treatment consisted of a velopharyngeal flap operation in one patient. In the other two patients attempts were made to elevate the soft palate by means of a prosthesis; the

procedure improved the speech of one child to some extent, but the prosthesis was not tolerated by the other patient. Speech was improved in the patient on whom the velopharyngeal flap operation was performed. One of the other patients has since had a velopharyngeal flap operation performed, with resulting speech improvement.

In each of the three patients, emotional problems were present.

PREPARATION FOR POSTINJECTION EMERGENCIES

By James S. Ainley, Jr. J.Philippine D.A. 15:9 Aug. 1961.

Any time a local anesthetic is administered, a situation of potential emergency exists. Local anesthetics are drugs that are potentially dangerous to the patient. Drug toxicity is directly proportional to the blood level concentration of the anesthetic solution. An inadvertent intravascular injection of a normally safe dose may suddenly result in an overdosage and toxicity. Lack of preparation by practitioners to handle such emergencies results in needless deaths every year.

When the rate of absorption or introduction into the blood stream of a drug exceeds the rate of detoxification or elimination, a toxic reaction will occur. The dental profession must accept the fact that only the aspirating type of syringe can be used with safety.

The subcutaneous injection is the least toxic. The drug becomes diluted by tissue fluids and is gradually absorbed into the blood stream. Intra-arterial injections do not carry great danger of a reaction because the flow of blood is away from the heart to the peripheral tissues, where dilution by tissue fluids occurs prior to reabsorption. Intravenous injections are extremely dangerous as the blood flows directly to the vital centers. For a given lethal subcutaneous dose, one fourth the dose intra-arterially, and one sixteenth the dose intravenously will produce fatal results.

The incorporation of epinephrine or other vasoconstrictors in the anesthetic greatly reduces the rate of absorption and localizes the anesthetic at the site of injection. Thus, the rate of drug destruction by the body can keep pace with the rate of entrance into the circulation.

To lessen the dangers of injections of local anesthetics, a careful history of the patient should be taken. The patient can be relieved from mental anxiety by keeping the syringe hidden from view. Prior to injection, the patient should be placed in a somewhat reclined position. The dentist should aspirate before injecting. He should inject slowly; a safe rate is one minute for a 2 cc. 2 per cent solution of anesthetic. The least volume of anesthetic necessary to do the job should be used. A vasoconstrictor should be used, unless contraindicated.

The least toxic of all local anesthetics is 1 to 2 per cent procaine. With procaine as a standard of comparison, cocaine is four times more toxic; butacaine, four times; pontocaine, ten times; nupercaine, six times; monocaine one third more toxic, and lidocaine is one half more toxic than procaine, but twice as potent. Lidocaine has a low incidence of systemic reaction. It differs chemically from procaine and therefore is the agent of choice in patients sensitive to procaine.

The incidence of postinjection emergencies could be reduced greatly by routine premedication with a short-acting barbiturate one half hour prior to appointment time. Such premedication will greatly allay patient apprehension that can precipitate shock. To overcome shock, the patient should be reclined with his feet placed higher than his head, oxygen should be administered and aromatic spirits of ammonia used. Three to four grains of caffeine sodiobenzoate given subcutaneously will stimulate circulation and restore blood pressure.

Toxic reactions to local anesthetics generally can be divided into the convulsive central nervous system stimulation and nonconvulsive depressed circulatory reaction. Excessive central nervous system stimulation is followed by central nervous depression and death by respiratory failure. If no other treatment is given, it is essential to administer oxygen. Death can be prevented by the support of respiration. Convulsions can be controlled by the slow intravenous administration of a short-acting barbiturate, such as 1 cc. per minute of 5 per cent pentobarbiturate. If blood pressure falls too low, an injection of 0.5 cc. 1:1,000 epinephrine may be given intravenously. This should be followed by 25 mg. ephedrine intravenously to maintain the blood pressure.

Circulatory depression usually is manifested only on high systemic concentrations of anesthetic. In cardiac arrest, the treatment is to lower the head, administer oxygen, deliver a sharp blow to the sternum, and render external cardiac massage. Epinephrine is not as effective in overcoming cardiac arrest as is generally believed; it more often proves fatal than produces beneficial results. Injection of epinephrine may precipitate ventricular fibrillation, which may prove fatal. All other methods should be exhausted before injecting epinephrine. If there is no resumption of heart beat, then 0.2 cc. of 1:1,000 solution of ep-

inephrine may be injected directly into the left ventricle. If the heart goes into ventricular fibrillation, several cubic centimeters of procaine injected into the left ventricle may reduce the irritation, break the fibrillation and save the patient's life.

Another untoward reaction to local anesthetics includes hypersensitivity to either the anesthetic or the incorporated vasoconstrictor. Anaphylaxis is a dramatic, often fatal, reaction. The drug, when first injected, causes no harmful result but acts as an antigen to which the host builds up antibodies. A second contact with the drug may cause death in minutes, death resulting from vasodilation and circulatory collapse. The treatment is to give an immediate slow intramuscular injection of 1 cc. 1:1,000 epinephrine.

Preparation is the key to handling postinjection emergencies. A properly equipped treatment kit may save a life in an emergency.

THE OCCURRENCE OF BACTERIA WITHIN THE CLINICALLY HEALTHY GINGIVAL CREVICE

By J. B. Gavin and A. A. Collins. J.Periodont. 32:198 July 1961.

Because the presence or absence of bacteria within the healthy gingival crevice is a subject of considerable controversy, it was decided to study this question further. The subjects consisted of 26 dental students who maintained a high standard of oral hygiene.

To overcome the problem of contamination from the tooth and gingival surfaces outside of but adjacent to the crevice, the following method was devised: A saliva ejector was used and cotton rolls were placed lingually and in the oral vestibule to isolate the selected area. The gingival and tooth surfaces were dried with gauze, care being taken to avoid introducing any foreign material into the crevice. A 5 mm. length of 19 gauge hypodermic needle with a smoothed 1 mm. bevel was held in a fine pair of artery forceps and sterilized in alcohol and a spirit flame. Once cool, this tube was placed perpendicularly to the tooth surface, with the bevel facing occlusally, on the labial or buccal free gingival margin. By careful rotation of this tube occlusally until it made an angle of about 20 degrees with the tooth surface, the gingival margin could be displaced laterally from the tooth. A sterile paper point passed through the tube in this position was used to collect material from the depths of the gingival crevice. The points, held in sterile tweezers, were passed gently into the crevice until resistance was felt. The points entered the crevices to a depth of 1 to 2 mm. At no time did the paper points touch either tooth or gingival surfaces external to the crevice.

The paper points with the absorbed material were cultured for aerobic and anaerobic microorganisms.

Of 63 crevices investigated by aerobic culture, 58 gave a growth of organisms. Of 46 crevices investigated by anaerobic culture, 43 gave a growth.

As a control of the method, to ensure that the material was collected from the depth of the crevice and was not contaminated by the tube, the tube was placed as described, removed, and a sterile point passed through the tube. Of 33 control paper points cultured, 3 gave a positive culture.

In a second group of seven subjects, the method was used after the application for three minutes of an iodine glycerol mixture (equal parts of 5 per cent iodine and glycerol) as used by Waerhaug and Steen (1952). Samples also were taken from gingival and tooth surfaces adjacent to the crevices investigated. Only 2 of 21 crevices gave a positive culture. The samples from adjacent tooth and gingival surfaces all were negative, indicating the effectiveness of this antiseptic.

Clinically healthy gingival crevices generally contain microorganisms.

SOME HISTOPATHOLOGIC CHANGES IN THE HAMSTER AS THE RESULT OF A CONTINUOUSLY ACTING ORTHODONTIC APPLIANCE

By Hugh I. Myers and William P. Wyatt. J.D. Res. 40:846 July-Aug. 1961.

A continuously acting orthodontic appliance, designed to produce mesial movement of the mandibular first molar, was placed in each of 30 hamsters about 60 days old. The appliance consisted of an orthodontic band with an eyelet and two retracting coil springs, each activated to produce about 4 ounces of applied force to the first molar. Five animals each were sacrificed on the first, second, third, fifth, seventh and ninth postoperative days, and the mandibles removed, sectioned and studied histologically.

The appliance worked in a very satisfactory manner. The hamster, with only two roots on each mandibular molar, was superior to the rat as an experimental animal in this type of study.

Evidence was found that (1) the normal distal drift of the second and third molars could be reversed by a mesial movement of the first molar, and (2) mesial movement of

the first molar was achieved with the orthodontic appliance.

In the first phase of orthodontic tooth movement, involving the first three postoperative days, the outstanding feature concerning the first molar was a region of pressure necrosis in approximately the upper 20 per cent of the periodontal membrane adjacent to the alveolar crest of the interseptal bone mesial to the first root and the interradicular bone mesial to the distal root. In these two regions the periodontal membrane width was narrowed, the collagenous fibers wrinkled, and there occurred a progressive diminution of fibroblast and other nuclei. In the animals sacrificed after three days, the regions were totally devoid of nuclei. In the animals sacrificed after three days, in a few instances a small number of osteoclasts were observed on the distal surface of the interradicular bone mesial to the distal root near its apex; a similar number were observed in the apical region of the interseptal bone mesial to the mesial root of the first molar. Some indication of bone apposition and accompanying osteoblasts was evident on the mesial surface of the first molar interradicular bone.

New bone formation as a result of the applied orthodontic force was seen to begin about five days after the appliance was placed and was continued through nine days. In those animals sacrificed after five, seven or nine postoperative days, the regions of pressure necrosis mesial to the two roots of the first molar were still present. However, there were also present osteoclasts in the coronal portion of the interradicular bone and at the gingival crest of the investing bone mesial to the mesial root. Especially in the animals sacrificed at nine days, new bone was observed somewhat consistently on the mesial surfaces of the interradicular and interseptal bone of the first molar in those sites identified as tension regions under the experimental conditions. In this second phase, the supporting tissues of the second and third molars manifested features indicating that a cessation, and probably a reversal, of the normal distal drift had been effectuated.

The final pathologic processes involved were not determined because the experiment did not extend beyond nine days.

EPITHELIOMA OF THE TONGUE

By Harvey Lash and John B. Erich. Am. J.Surg. 102:42 July 1961.

A study has been made of 217 patients with squamous cell carcinoma of the tongue, seen at the Mayo Clinic in the five year period from 1949 through 1953. Squamous cell carcinoma of the tongue comprises about 0.8 per cent of all new cases of cancer and is responsible for 0.5 to 2 per cent of all deaths from cancer.

Fifty-nine per cent of the 217 patients were in their fifties and sixties. The youngest patient was 23 years old and the oldest was 93 years old. Five per cent of the patients were less than 40 years old, and 23 per cent were 70 years old or older.

Seventy-five per cent of the patients were men. Thirty-seven per cent of the 142 traced men with infiltrating epitheliomas of the tongue were alive five years or more later, whereas 52 per cent of the 46 traced women with infiltrating disease lived five years or more.

Pain, either in the tongue or elsewhere, is the commonest complaint in this disease; it was present in 147 (68 per cent) of the 217 patients, and was the presenting symptom in 134 patients.

The duration of the natural course of the disease appears to be about 18 months.

Forty-nine per cent of the patients who began treatment less than two months after the onset of the initial symptoms survived for five years or more, whereas 30 per cent of those treated within two to six months survived for five years, and only 20 per cent of the patients treated within 6 to 18 months survived for five years. Thus, it appears that initiating treatment within two months of the onset of the initial symptoms can salvage an additional 20 to 30 per cent of these patients.

Of 153 patients with infiltrating lingual carcinoma who received their entire treatment at the Mayo Clinic, 63 (42.3 per cent) lived five years or more after treatment. Eighteen patients had *en bloc* dissection involving the tongue and neck, and nine survived for five years or more; however, only two of these patients had proved cervical metastasis.

Suprahyoid dissection rarely is indicated in the management of this disease. Prophylactic dissection of the neck is not recommended as a routine procedure but is of value in selected instances.

CENTRAL NERVE FIBER DEGENERATION CAUSED BY TRIORTHOCRESYL PHOSPHATE

By P. Glees. German M.Monthly 6:245 Aug. 1961 (in English).

During the last 30 years, many instances of poisoning have occurred attributable to the toxic effects of triorthocresyl, $(CH_3C_6H_4O)PO$. This oily, colorless and odorless compound is used for various industrial purposes, mainly as a lubricant, additive or plasticizer in the man-

ufacture of pliable plastic products. Many other plasticizers are similarly toxic.

The first occurrence of widespread poisoning caused by triorthocresyl phosphate was observed at the time of prohibition in the United States. During this period, more than 15,000 persons became paralyzed after consuming illegally produced drinks to which triorthocresyl phosphate had been added to procure a pleasant color and an increased viscosity. The basis of those drinks was Jamaica ginger, and the resultant paralysis, therefore, was termed "ginger paralysis."

From 10 to 14 days after consumption of such drinks, the initial neurologic symptoms appeared, resembling the signs of flaccid paralysis. In the early stages, no neurohistologic examinations could be made, and at postmortem examinations it was impossible to differentiate between the primary and secondary changes occurring in the central nervous system.

Similar outbreaks of triorthocresyl poisoning have been reported in other countries from time to time. In the Swiss armed forces, an entire company of soldiers became poisoned after having used lubricating oil for cooking oil. Paralysis associated with loss of muscle tonus appeared in the majority of soldiers.

A similar incidence occurred in 1940 in Eckenförde, Schleswig-Holstein, Germany. Many of the 20,027 residents of this town were seriously affected, and received treatment at the Neurological Clinic of the University of Kiel. In 1959, H. G. Creutzfeld and G. Orzechowski reported on this poisoning affecting almost an entire community, and described the symptoms such as motor disturbances, sensory disorders (paresthesia) and occasionally damage to the cranial nerves (involving the facial nerve).

After the toxic effects of triorthocresyl phosphate were recognized, animal experiments were carried out in various countries to determine the lethal dose, the susceptibility of different species, and the sequence of neurologic signs which triorthocresyl phosphate or related compounds produce.

In 1957, K. Hierholzer, H. Noetzel and L. Schmidt reported the results of their experiments with cats and rats. In both animal species, the oral administration of 0.2 Gm. triorthocresyl phosphate per kilogram of body weight proved toxic. This dose corresponds to the amount (0.15 to 0.3 Gm. per kilogram body weight) that Creutzfeld and Orzechowski had estimated to have toxic effects in man.

At the University Laboratory of Physiology, Oxford, England, the author experimented with hens. In these birds, the symptoms of triorthocresyl phosphate poisoning are similar to those in man. The observed results of cutaneous application of from 0.1 to 0.2 ml. of triorthocresyl phosphate per kilogram body weight in hens were as follows:

1. Complete loss of appetite, immediately after application.
2. Involuntary motor activity (localized fit), which was manifested by repeated shaking of the head and seizures, from three to four days after application.
3. Progressive paralysis and atrophy of the muscles of the head, mouth (especially those of the tongue), pharynx and larynx, and degeneration of the nuclei and fibers of the central nerves, 15 days after application.
4. Death caused by respiratory failure, 25 days after application.

Characteristic general and neurotoxic effects were produced by comparatively small quantities of triorthocresyl phosphate (0.1 to 0.2 ml. per kilogram body weight), injected into the comb of a hen. Oral doses of cortisone were effective in counteracting these toxic effects and, therefore, the use of adrenal cortical hormones should be considered for treatment of poisoning in man caused by triorthocresyl phosphate.

CARBAZOCHROME SALICYLATE AS A SYSTEMIC HEMOSTATIC AGENT IN PLASTIC OPERATIONS

By Eldon R. Dykes and Robin Anderson. J.A.M.A. 177:716 Sept. 9, 1961.

The control of bleeding is a major surgical problem, which would be minimized if a systemic hemostatic agent could be administered preoperatively to the patient. Carbazochrome salicylate, one of the oxidation products of epinephrine, has been promoted as such an agent. The Council on Drugs of the American Medical Association has cautioned that there is insufficient evidence to prove that cessation of bleeding could be attributed to the action of this drug. Most of the reports of its success have been in uncontrolled series.

A double-blind clinical study was planned in such a manner that the surgeon who administered the carbazochrome salicylate had no control over the selection of the patients to receive it, and the surgeon who rated the amount of bleeding at the time of operation did not know whether the patient had or had not received the agent. The method of stratified random sampling was used: the surgical procedures were divided into nine categories; one half the number of patients in each category received carbazochrome whereas the other half did not. Thus, each category of surgical procedure had its own control group. The decision as to whether a given patient

would receive carbazochrome was left to chance alone by drawing numbers from a box. The series consisted of 182 patients, of whom 92 were given carbazochrome, administered intramuscularly according to the manufacturer's recommendations. On completion of the surgical procedure, the operating surgeon evaluated the amount of bleeding.

There was no statistically significant difference in the amount of bleeding between the patients who received carbazochrome and those who did not receive it. On the basis of this study, carbazochrome does not demonstrate significant hemostatic action.

EXPERIMENTAL AND CLINICAL STUDIES OF THE ANTICANCER EFFECT OF ANTIBIOTICUM BULGARICUS

By I. Bogdanov and P. Pophristov. Abstr. Bulgarian Sci.Lit. 4:13 April-June 1961.

The anticarcinogenic effects claimed for a recently developed antibiotic substance derived from a 24-hour culture of *Lactobacillus bulgaricus* were investigated at the Dental Clinic of the Faculty of Medicine of the Chervenko Higher Institute in Sofia, Bulgaria. The nonpathogenic bacteria were cultured in a soya nutritive medium especially conducive to their growth.

Doses of 0.5 to 1.0 cc. of a filtrate of the antibiotic were injected intradermally at intervals of from one to eight days in 465 albino mice; 119 other mice served as control animals.

The experiments were carried out after the malignant tumors had reached from 10 to 12 cm. in diameter. From 1 to 15 injections were given.

The 119 control animals were divided into two groups. The first group, consisting of 79 animals, received no treatment; the second group, consisting of 40 animals, received only the soya broth culture mixed with concentrated lactic acid. In the 119 control animals, 180 malignant tumors (mainly sarcomas) developed. All 119 animals died.

In 136 (30 per cent) of the experimental animals, complete cure resulted which was manifested by cicatrization after necrosis. In 162 (36 per cent) of the experimental animals, the malignant tumors remained unaffected. In 157 (34 per cent) of the experimental animals, complete cure seemed to be obtained but the animals perished probably because of the rapid tumor destruction. Follow-up observations of the surviving animals were carried out for 220 days; neither recurrences nor metastases were encountered.

Reimplantation of carcinogenic tissues in 70 of the surviving (cured) animals led to no reappearance of the primary tumor.

The antibiotic substance proved to be anticarcinogenic in instances of cancer of the oral mucosa or the facial skin such as basal cell carcinoma, squamous cell carcinoma, metastases from different carcinoma types, lymphogranuloma, mycosis fungcides and keratoacanthoma, but proved to be ineffective against common verrucae.

The method used consisted in injecting the purified concentration of the antibiotic filtrate locally into the tumor. Controlled investigations revealed that the active mechanism was of a specific character—the result of cultivating the microorganisms from which the antibiotic agent was derived. The presence of other ingredients such as lactic acid (from 5 to 10 per cent) seemed to be of secondary importance.

The antibiotic substance displayed no effect if injected into healthy skin or oral tissues. No toxic phenomena were observed. Unquestionably, the antibiotic agent possesses a selective anticarcinogenic property.

ARTHROSIS OF THE TEMPOROMANDIBULAR JOINT: HYALURONIDASE AND HYDROCORTISONE THERAPY

By Hanna Borszewska, Wladyslaw Lewandowski and Krystyna Nowicka. Czas.-stomat. 14:339 May 1961.

An effort has been made to analyze the symptoms of arthrosis of the temporomandibular joint, and the effects of hyaluronidase and hydrocortisone therapy used at the Stomatologic Clinic of the University of Poznań, Poland.

The analysis confirmed earlier clinical findings that women between the ages of 20 to 30 years are more prone to this joint disease than men, the ratio being 3 to 1.

Most patients sought treatment at the clinic from three to six months after the initial appearance of the symptoms, manifested by pathologic processes of a postinflammatory or posttraumatic nature.

The etiologic cause was extrinsic trauma in 20 per cent, and intrinsic trauma in 80 per cent of the patients. There was a gradual symptomatic onset in 63 per cent, and a sudden onset in 37 per cent.

Malocclusion of different types accounted for 58 per cent, and overbite (horizontal or vertical) for 30 per cent.

Clicking occurred in 56 per cent, and the remaining patients complained about extreme pain in the immediate region of the joint, or about referred pain associated with mandibular movements.

Ear symptoms were rarely observed, and there was no association between the arthrosis of the temporomandibular joint and Costen's syndrome.

In all instances, the articular tubercle of the condyles was covered with a collagenous layer. The apexes and posterior walls of the glenoid fossa had no collagenous covering.

Hyaluronidase and hydrocortisone therapy was effective in obtaining regular exchange of liquids between the joint cavities and their environment, and in improving the blood circulation and nutritional supply in the intra-articular spaces. Both drugs, intraarticularly injected, prevented the formation of cicatricial tissue. Hyaluronidase, administered in single doses of from 100 to 150 units in patients with protraction, had also an analgesic effect. Hydrocortisone, administered in single doses of from 5 to 7 mg., was used mainly in patients with degenerative joint processes accompanied by excessive mobility of the mandible. In instances of malocclusion and extreme overbite, orthodontic treatment was applied supplementary to the specific (hyaluronidase or hydrocortisone) therapy.

Complete cure was obtained in 72 per cent, profound improvement in 20 per cent, and the therapy failed in 8 per cent of the 34 patients treated.

INCREASE IN BLOOD LEVELS AFTER APPLICATION OF A TETRACYCLINE-CHLORTETRACYCLINE COMBINATION

By C. Van Marwyck and G. Gängel. Arzneimitt.Forsch. 11:769 Aug. 1961.

Comparative investigations on the serum concentrations following oral application of a combination of tetracycline and chlortetracycline (Supramycin), and tetracycline alone, were carried out at the Hygiene Institute of Bremen, Germany.

Any recently discovered antibiotic agent (such as Supramycin) may be either entirely new or related in action and structure to other antibiotics already used in dental and medical practice. However close the relationship, the discovery may be worth while if the new member of an already accepted group possesses advantages over the other antibiotics in its activity, pharmacological behavior or other properties. Such a group is that of the tetracyclines consisting of chlortetracycline, oxytetracycline and tetracycline, and the new member, Supramycin, a combination in capsule form (125 mg. chlortetracycline hydrochloride and 125 tetracycline hydrochloride per capsule).

After the oral application of the combination antibiotics in 42 dental patients, the concentrations in blood and serum were about twice as high as after tetracycline (500 mg.) application used as the sole antibiotic agent.

The significant properties of the new antibiotic were demonstrated as follows: (1) an antibacterial activity against most pathologic oral bacteria, exceeding that of tetracycline; (2) an extremely high stability, and (3) a rate of renal excretion less than half that of tetracycline. These findings proved that therapeutic concentrations of the new antibiotic are maintained in the blood for a much longer time after a single dose than those of other members of the tetracyclines.

From the results of this study it could be concluded that the new antibiotic can be administered at longer intervals than the other tetracyclines—two doses daily will suffice for most dental procedures—and that a smaller dose of this antibiotic will achieve a therapeutic effect equivalent to 1 Gm. of chlortetracycline hydrochloride, oxytetracycline hydrochloride or tetracycline hydrochloride, applied orally four times a day.

However, larger doses of the new antibiotic may cause diarrhea; whether this side effect exceeds that of the other tetracyclines is uncertain.

The combination antibiotic seems to offer remarkable advantages for use in dental practice without any evident disadvantages regarding its tolerability. It is extremely effective in the treatment of oral infections caused by various gram-positive and gram-negative bacteria, certain species of rickettsia, and viruses.

deaths

BUREAU OF MEMBERSHIP RECORDS

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Iams, Frank C., Pittsburgh; Ohio College of Dental Surgery, University of Cincinnati, 1900; died May 15, 1961; age 83.

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Ingram, Harold P., Miami, Fla.; Atlanta-Southern Dental College, 1917; died May 19, 1961; age 67.

Ingram, William A., Monroe, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1926; died May 1, 1961; age 58.

Inman, Ralph J., Riverton, Wyo.; Colorado College of Dentistry, 1914; died January 24, 1961; age 76.

Iverson, Justine C., Oak Park, Ill.; Chicago College of Dental Surgery, 1904; died February 25, 1961; age 79.

Jackson, Robert G., Peoria, Ill.; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1931; died February 16, 1961; age 52.

Jacobs, William E., Plymouth Village, Minn.; University of Michigan School of Dentistry, 1934; died January 8, 1961; age 56.

Johnson, Arthur L., Evanston, Ill.; Northwestern University Dental School, 1921; died June 16, 1961; age 67.

Johnson, Carl W., Tacoma, Wash.; North Pacific College of Oregon School of Dentistry, 1919; died May 25, 1961; age 65.

Johnson, Ernest W. H., Detroit; Northwestern University Dental School, 1912; died May 7, 1961; age 80.

Johnston, Charles B., Bastrop, La.; University of Tennessee College of Dentistry, 1908; died February 27, 1961; age 73.

Jones, John J., Omaha; Meharry Medical College School of Dentistry, 1919; died June 5, 1961; age 64.

Karpawich, Anthony J., Worcester, Mass.; Tufts College Dental School, 1932; died March 20, 1961; age 54.

Kellogg, Richard G., Detroit; University of Michigan School of Dentistry, 1934; died May 31, 1961; age 53.

Kelly, Charles H., Davenport, Iowa; University of Iowa College of Dentistry, 1909; died February 23, 1961; age 73.

Kenner, Clyde D., Seward, Neb.; Omaha Dental College, 1905; died January 28, 1961; age 81.

Kerr, Mark C., Canton, Ohio; St. Louis University School of Dentistry, 1918; died March 30, 1961; age 77.

Kerwin, James G., Passaic, N. J.; University of Maryland, Dental Department, 1912; died March 29, 1961; age 71.

Kesden, David J., Rochester, N. Y.; University of Michigan School of Dentistry, 1924; died June 26, 1961; age 66.

Kesling, Elmer G., Richmond Heights, Mo.; Chicago College of Dental Surgery, 1903; died March 11, 1961; age 79.

King, Dudley T., Bandera, Texas; Texas Dental College, 1930; died March 4, 1961; age 56.

King, John E., Worcester, Mass.; University of Maryland, Dental Department, 1910; died February 18, 1961; age 74.

Kirschbaum, Charles A., Lynbrook, N. Y.; New York College of Dentistry, 1916; died April 3, 1961; age 65.

Knepp, Charles E., Melbourne, Fla.; Washington University School of Dentistry, 1905; died March 29, 1961; age 87.

Knutson, Alfred J., Zumbrota, Minn.; University of Minnesota School of Dentistry, 1913; died January 16, 1961; age 73.

Kohler, Kenneth N., Harrisburg, Pa.; Temple University School of Dentistry, 1933; died December 30, 1960; age 54.

Kuechle, Theodore, Milwaukee; Milwaukee Medical College Dental Department, 1905; died June 8, 1961; age 79.

Kuratli, John, Portland, Ore.; North Pacific College of Oregon School of Dentistry, 1919; died April 29, 1961; age 64.

Kutz, Forrest, El Centro, Calif.; Kansas City Dental College, 1913; died March 9, 1961; age 70.

Kyle, Raymond A., Highland, Ill.; St. Louis University School of Dentistry, 1919; died February 1, 1961; age 63.

Lackey, Clayton J., Bremerton, Wash.; Northwestern University Dental School, 1903; died April 10, 1961; age 86.

Lahr, Eldon G., Chicago; Northwestern University Dental School, 1924; died March 28, 1961; age 62.

Laird, Arthur M., Lebanon, Ky.; Louisville College of Dentistry, 1904; died April 25, 1961; age 80.

Larsen, Otto H., Chicago; Northwestern University Dental School, 1919; died April 9, 1961.

Lawler, Miles E., Minneapolis; University of Minnesota School of Dentistry, 1920; died February 25, 1961; age 65.

Lederkramer, Leon, New York; New York University College of Dentistry, 1934; died April 6, 1961; age 51.

Lee, James M., Waterbury, Conn.; Tufts College Dental School, 1932; died March 23, 1961; age 52.

Lee, John R., Sedalia, Mo.; St. Louis University School of Dentistry, 1905; died April 29, 1961; age 79.

Leeper, Joseph B., Columbus, Ohio; Ohio State University College of Dentistry, 1949; died February 24, 1961; age 42.

Lefkow, Leo, New York; University of Illinois College of Dentistry, 1939; died May 1, 1961.

Leggett, Laurence L., Mount Airy, Md.; Baltimore College of Dental Surgery, University of Maryland, 1930; died May 9, 1961; age 58.

Levitch, Herman C., Memphis, Tenn.; University of Tennessee College of Dentistry, 1937; died March 2, 1961; age 49.

Liesemer, Arnold P., Chicago; Northwestern University Dental School, 1928; died May 23, 1961; age 59.

Lindahl, Carl A., Minneapolis; University of Minnesota School of Dentistry, 1929; died February 6, 1961; age 56.

Lloyd, J. Harry, Atchison, Kan.; Barnes Dental College, 1904; died April 11, 1961; age 87.

Locher, Joseph J., Dubuque, Iowa; University of Iowa College of Dentistry, 1923; died February 8, 1961; age 66.

Lockard, Adelbert B., Spokane, Wash.; University of Iowa College of Dentistry, 1907; died January 20, 1961; age 76.

Loewinger, Louis, Brooklyn; New York College of Dentistry, 1907; died April 14, 1961; age 79.

Love, Jessie J., Manistee, Mich.; died April 27, 1961; age 78.

Low, Howard Y., San Francisco; College of Physicians and Surgeons, School of Dentistry, 1938; died March 30, 1961; age 48.

Luber, Eli, Chicago; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1933; died April 24, 1961; age 51.

Lumsden, John E., III, Portsmouth, Va.; Medical College of Virginia School of Dentistry, 1954; died January 1, 1961; age 35.

Lutz, Samuel C., Denver; University of Denver School of Dentistry, 1925; died May 2, 1961; age 60.

Lynaugh, Edward A., Pascoag, R. I.; University of Maryland, Dental Department, 1915; died June 21, 1961; age 68.

MacFadden, Cornelius C., Sherburn, Minn.; University of Iowa College of Dentistry, 1901; died December 27, 1960; age 84.

Maged, Howard E., Suffern, N. Y.; University of Pennsylvania School of Dentistry, 1936; died February 22, 1961; age 48.

Mallon, James R., Philadelphia; University of Pennsylvania School of Dentistry, 1906; died May 14, 1961; age 77.

Mallory, Lloyd R., Youngstown, Ohio; Ohio State University College of Dentistry, 1928; died March 7, 1961; age 57.

Manton, James M., Buda, Ill.; Chicago College of Dental Surgery, 1899; died December 30, 1960; age 76.

Marks, Sidney M., Buffalo; University of Buffalo School of Dentistry, 1918; died February 9, 1961; age 65.

Marshall, Benjamin, Chicago; University of Illinois College of Dentistry, 1923; died June 12, 1961; age 71.

Marshall, Jay P., Maplewood, Mo.; University of Illinois College of Dentistry, 1905; died April 5, 1961; age 76.

Martell, Albert R., Seligman, Mo.; Kansas City-Western Dental College, 1930; died May 2, 1961; age 54.

Martin, Roy L., Miami, Fla.; died April 2, 1961; age 65.

Martusciello, Michael S., New York; New York University College of Dentistry, 1942; died January 22, 1961; age 44.

Masemore, Lloyd M., Olympia, Wash.; North Pacific College of Oregon School of Dentistry, 1918; died March 3, 1961; age 72.

McArdle, John H., Hemet, Calif.; North Pacific College of Oregon School of Dentistry, 1924; died March 1, 1961; age 61.

McCann, Martin P., Newcastle, Pa.; University of Pennsylvania School of Dentistry, 1916; died March 19, 1961; age 66.

McCauley, John O., Sturgis, Ky.; Louisville College of Dentistry, 1908; died February 14, 1961; age 80.

McCully, Gene J., Manitowoc, Wis.; Marquette University School of Dentistry, 1928; died April 12, 1961; age 55.

McDonald, Thaddeus L., Washington, D.C.; University of Minnesota School of Dentistry, 1933; died April 1, 1961; age 58.

McGovern, Irving A., Saginaw, Mich.; University of Detroit School of Dentistry, 1935; died June 13, 1961; age 58.

McGuiggan, Charles A., Marshall, Minn.; Marquette University School of Dentistry, 1915; died June 12, 1961; age 69.

McKay, Waller K., Baton Rouge, La.; Loyola University School of Dentistry, New Orleans, 1941; died February 28, 1961; age 47.

McManus, Amos A., McBee, S. C.; Southern Dental College, 1907; died May 19, 1961; age 80.

McNeely, Charles M., Floral Park, N. Y.; University of Buffalo School of Dentistry, 1904; died May 1, 1961; age 81.

McRedmond, Dennis F., New York; University of Buffalo School of Dentistry, 1908; died May 21, 1961, age 75.

Mehlhaff, John E., Lodi, Calif.; Kansas City Dental College, 1916; died June 23, 1961; age 69.

Miller, Eli, Worcester, Mass.; Tufts College Dental School, 1919; died November 21, 1960; age 62.

Miller, William J., Everest, Kan.; Western Dental College, 1905; died February 23, 1961; age 79.

Miner, Walter H., Norfolk, Neb.; Lincoln Dental College of Cotner University, 1915; died June 2, 1961; age 70.

Mitchell, Iverson O., Washington, D. C.; Howard University College of Dentistry, 1915; died June 10, 1961; age 68.

Mitchell, Leo W., Panama City, Fla.; University of Tennessee College of Dentistry, 1954; died February 12, 1961; age 39.

Mitchell, Louie W., Augusta, Ga.; Atlanta-Southern Dental College, 1918; died April 2, 1961; age 66.

Molony, William W., Aiken, S. C.; Atlanta-Southern Dental College, 1926; died May 26, 1961; age 56.

Montgomery, Paul J., Little Rock, Ark.; Creighton University School of Dentistry, 1925; died February 25, 1961; age 59.

Moore, Floyd R., Rice Lake, Wis.; Marquette University School of Dentistry, 1912; died May 1961; age 77.

Moore, John L., Bethel Springs, Tenn.; died February 5, 1961; age 97.

More, Warren D., Sonoma, Calif.; University of California College of Dentistry, 1934; died June 7, 1961; age 52.

Morgan, Laurence E., Fort Worth, Texas; Vanderbilt University School of Dentistry, 1906; died January 27, 1961; age 78.

Morris, Hugh D., Cambridge City, Ind.; Indiana Dental College, 1915; died May 2, 1961; age 73.

Morrison, Charles K., Decatur, Ill.; University of Louisville School of Dentistry, 1919; died March 24, 1961; age 76.

Morrison, William E., Philadelphia; Howard University College of Dentistry, 1920; died February 15, 1961; age 66.

Morse, Charles L., Chicago; Northwestern University Dental School, 1905; died January 5, 1961; age 78.

Moyer, William H., Baldwinsville, N. Y.; University of Buffalo School of Dentistry, 1907; died March 13, 1961; age 77.

Mugalian, Levon B., Evanston, Ill.; Northwestern University Dental School, 1914; died May 1, 1961; age 71.

Munro, Edward F., Northbrook, Ill.; University of Illinois College of Dentistry, 1921; died November 29, 1960; age 73.

Myers, Herbert R., Lima, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1910; died April 2, 1961; age 75.

Myers, Wiley E., Christiana, Pa.; University of Pennsylvania School of Dentistry, 1906; died April 16, 1961; age 84.

Myrick, Floyd F., Covina, Calif.; University of Southern California School of Dentistry, 1947; died March 5, 1961; age 37.

Nadeau, Frederic A., Bellevue, Mich.; University of Michigan School of Dentistry, 1929; died April 23, 1961; age 62.

Nagelsaker, Ole B., Decorah, Iowa; Chicago College of Dental Surgery, 1907; died March 11, 1961; age 83.

Nare, Herman, Chicago; Chicago College of Dental Surgery, 1923; died May 25, 1961; age 69.

Nemetz, Matt A., Manitowoc, Wis.; Marquette University School of Dentistry, 1918; died June 4, 1961; age 69.

Newman, James A., Jackson, Tenn.; University of Tennessee College of Dentistry, 1904; died April 22, 1961; age 83.

Nydegger, Carl, Menlo Park, Calif.; Philadelphia Dental College, 1901; died June 22, 1961; age 87.

Ober, Roy A., Cleveland Heights, Ohio; Starling-Ohio Medical College Department

of Dentistry, 1912; died June 9, 1961; age 70.

O'Brien, Ivan F., Seattle; North Pacific College of Oregon School of Dentistry, 1926; died April 10, 1961; age 63.

O'Brien, Michael E., Boonville, N. Y.; University of Buffalo School of Dentistry, 1906; died April 15, 1961; age 81.

O'Connor, Walter H., Westport, Conn.; University of Pennsylvania School of Dentistry, 1921; died April 27, 1961; age 70.

Ogle, Bernard S., Knoxville, Tenn.; University of Tennessee College of Dentistry, 1934; died March 21, 1961; age 52.

O'Neill, Michael J., Flint, Mich.; University of Michigan School of Dentistry, 1907; died May 24, 1961; age 75.

Opdahl, Olaf S., Chicago; Chicago College of Dental Surgery, 1929; died May 16, 1961; age 58.

Orr, Ira D., West Newton, Pa.; Pittsburgh Dental College Western University of Pennsylvania, 1899; died April 30, 1961; age 82.

Oursler, William W., Memphis, Tenn.; Vanderbilt University School of Dentistry, 1908; died March 7, 1961; age 72.

Owens, John S., Medford, N. J.; University of Pennsylvania School of Dentistry, 1907; died May 21, 1961; age 74.

Oyer, Demont F., Wolcott, N. Y.; University of Buffalo School of Dentistry, 1924; died March 21, 1961; age 60.

Park, Jerman C., Dekalb, Ill.; Kansas City Dental College, 1900; died January 2, 1961; age 80.

Paulson, Otto M., Seattle; Chicago College of Dental Surgery, 1916; died February 1, 1961; age 69.

Pennington, Patton A., Louisville, Ky.; Tennessee Medical College Dental Department, 1890; died March 24, 1961; age 94.

Phelan, Robert P., Milwaukee; Marquette University School of Dentistry, 1919; died May 21, 1961; age 66.

Phillips, Brewer E., Salt Lake City; Baylor University College of Dentistry, 1919; died March 8, 1961; age 67.

Phillips, Fred K., Claremont, N. H.; University of Pennsylvania School of Dentistry, 1916; died April 14, 1961; age 67.

Pihlfeldt, Edward R., Lincolnwood, Ill.; Northwestern University Dental School, 1909; died April 24, 1961; age 74.

Pike, Charles G., Wellesley Hills, Mass.; Harvard Dental School, 1901; died June 11, 1961; age 83.

Poage, Claud W., Willow Springs, Mo.; Western Dental College, 1908; died February 7, 1961; age 75.

Polanco, Frederick E., Baltimore; University of Maryland, Dental Department, 1919; died June 3, 1961; age 64.

Pomerance, Isaac S., Chicago; Northwestern University Dental School, 1917; died June 20, 1961; age 75.

Pond, Harold L., Duluth, Minn.; University of Minnesota School of Dentistry, 1924; died March 14, 1961; age 66.

Pope, Caston, Belmont, Calif.; College of Physicians and Surgeons, School of Dentistry, 1925; died April 7, 1961; age 66.

Post, Raymond W., Van Nuys, Calif.; University of Illinois College of Dentistry, 1923; died March 24, 1961; age 62.

Postma, John R., Peru, Ill.; Washington University School of Dentistry, 1923; died April 3, 1961; age 62.

Powell, Henry A., Little Rock, Ark.; Meharry Medical College School of Dentistry, 1912; died February 26, 1961; age 73.

Prewitt, Millard A., Ossining, N. Y.; University of Nebraska College of Dentistry, 1931; died May 31, 1961; age 56.

Priest, Charles A., Marion, Ind.; Indiana Dental College, 1904; died June 6, 1961; age 84.

Pritz, Robert W., Denver; University of Denver School of Dentistry, 1930; died February 20, 1961; age 55.

Pursell, William A., Denver; University of Denver School of Dentistry, 1903; died March 9, 1961; age 84.

Quirk, Pierce A., Jersey City, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1927; died May 20, 1961; age 60.

Ramstead, Henry G., Minneapolis; University of Minnesota School of Dentistry, 1907; died February 26, 1961; age 79.

Randall, Oloff W., Eagle, Colo.; University of Michigan School of Dentistry, 1897; died March 10, 1961; age 84.

Rasnick, Nathan N., Maplewood, N. J.; University of Michigan School of Dentistry, 1928; died June 14, 1961; age 56.

Rauch, Samuel, San Antonio, Texas; University of Minnesota School of Dentistry, 1913; died May 7, 1961; age 70.

Redden, James A., Springfield, Mass.; Tulane University School of Dentistry, 1922; died March 24, 1961; age 62.

Reeb, Carl A., Wilmette, Ill.; Northwestern University Dental School, 1930; died April 28, 1961; age 56.

Reed, Fred C., Lexington, Ga.; Southern Dental College, 1902; died February 10, 1961; age 81.

Reed, Ross A., Bellaire, Ohio; Ohio Medical University College of Dentistry, 1905; died February 12, 1961; age 78.

Reed, William B., Nashville, Tenn.; Meharry Medical College School of Dentistry, 1906; died April 7, 1961; age 80.

Reeves, Leonard D., Latrobe, Pa.; University of Pittsburgh School of Dentistry, 1924; died May 13, 1961; age 63.

Reid, William T., Reno, Nev.; Western Reserve University School of Dentistry, 1908; died May 16, 1961; age 77.

Render, Alonzo C., Brownsville, Texas; Northwestern University Dental School, 1901; died March 23, 1961; age 84.

Rentchler, Edgar D., St. Louis; St. Louis University School of Dentistry, 1918; died April 16, 1961; age 68.

Riddering, Albert G., Grand Rapids, Mich.; University of Michigan School of Dentistry, 1918; died April 9, 1961; age 70.

Riffe, Robert W., Northfork, W. Va.; Louisville College of Dentistry, 1916; died June 24, 1961; age 70.

Rigby, George R., Layton, Utah; University of Kansas City School of Dentistry, 1956; died February 8, 1961; age 35.

Rinehart, Curtis N., Newhall, Calif.; Chicago College of Dental Surgery, 1911; died March 4, 1961; age 80.

Ritchie, Herman A., Pittsburgh; Philadelphia Dental College, 1900; died December 11, 1960; age 86.

Ritterman, Henry A., Red Bank, N. J.; University of Pennsylvania School of Dentistry, 1932; died February 18, 1961; age 53.

Roach, Ebbie L., Trenton, Mich.; Detroit College of Medicine, Department of Dental Surgery, 1901; died April 2, 1961; age 87.

Roberts, Drew D., Jacksonville, Fla.; Southern Dental College, 1904; died May 12, 1961; age 84.

Robinson, Harry S., Barnstable, Mass.; New York College of Dentistry, 1917; died October 23, 1960; age 71.

Robinson, Herman D., New York; New York College of Dentistry, 1912; died February 4, 1961; age 70.

Robinson, Laurence H., St. Louis; Washington University School of Dentistry, 1931; died January 16, 1961; age 54.

Robinson, William J., Philadelphia; Philadelphia Dental College, 1904; died April 8, 1961; age 81.

Rockey, Clinton G., Lancaster, Calif.; University of Illinois College of Dentistry, 1921; died March 29, 1961; age 70.

Rodgers, Frank C., St. Louis; Northwestern University Dental School, 1907; died April 3, 1961; age 80.

Roe, Arthur, Chicago; Northwestern University Dental School, 1923; died April 10, 1961; age 58.

Rogers, Lloyd, Detroit; University of Michigan School of Dentistry, 1911; died June 3, 1961; age 75.

Rohloff, Herman F., Shawano, Wis.; Marquette University School of Dentistry, 1909; died February 19, 1961; age 81.

Rooney, Thomas A., Chicago; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1930; died May 28, 1961; age 54.

Roper, James A., Ozark, Mo.; Kansas City Dental College, 1907; died February 22, 1961; age 78.

Roschelle, Martin S., Indianapolis; Indiana University School of Dentistry, 1937; died June 18, 1961; age 51.

Rose, Gilbert H., Philadelphia; Temple University School of Dentistry, 1926; died March 11, 1961; age 59.

Rose, Thomas P., Bloomington, Ill.; Chicago College of Dental Surgery, 1915; died June 21, 1961; age 77.

Roseberry, Robert L., San Francisco; College of Physicians and Surgeons, School of Dentistry, 1937; died April 24, 1961; age 57.

Rosen, Isidore J., New Orleans; Tulane University School of Dentistry, 1928; died February 10, 1961; age 61.

Rosenthal, William, Los Angeles; University of Illinois College of Dentistry, 1918; died February 22, 1961; age 65.

Ross, Milton R., Long Branch, N. J.; Harvard Dental School, 1934; died May 1, 1961; age 49.

Rowland, LeRoy T., Blue Island, Ill.; Northwestern University Dental School, 1918; died March 14, 1961; age 68.

Roy, Tesca R., Jr., Mansura, La.; Loyola University School of Dentistry, New Orleans, 1932; died April 24, 1961; age 51.

Rozmarynowski, Joseph J., Uleta, Fla.; Marquette University School of Dentistry, 1911; died December 1960; age 70.

Ruelberg, Reinhold, Chatham, Mass.; Harvard Dental School, 1907; died February 16, 1961; age 84.

Russell, Frederick A., East Hampton, N. Y.; Temple University School of Dentistry, 1905 died April 14, 1961; age 82.

Sackrider, Charles A., Owosso, Mich.; Detroit College of Medicine, Department of Dental Surgery, 1903; died February 15, 1961; age 83.

Sacks, Max S., New York; University of Illinois College of Dentistry, 1928; died May 1, 1961; age 57.

Sage, John E., Flushing, N. Y.; Tufts College Dental School, 1928; died May 5, 1961; age 60.

Sager, Louis E., Roslindale, Mass.; Tufts College Dental School, 1918; died June 20, 1961; age 69.

Sapp, Carlos J., Lebanon, Pa.; University of Pittsburgh School of Dentistry, 1930; died January 7, 1961; age 54.

Sayer, Grover C., Jr., Denver; University of Texas School of Dentistry, 1951; died February 16, 1961; age 43.

Schaefer, Joseph E., Chicago; Chicago College of Dental Surgery, 1907; died June 28, 1961; age 76.

Schaffer, Harry, Brooklyn; Columbia University, School of Dental and Oral Surgery, 1926; died March 10, 1961; age 65.

Scheinberg, Abram J., Brooklyn; College of Dental and Oral Surgery, 1919; died March 1961; age 63.

Schewe, Earl C., St. Louis; St. Louis University School of Dentistry, 1921; died March 25, 1961; age 62.

Schifferdecker, Charles L., Boston; University of Buffalo School of Dentistry, 1912; died December 15, 1960; age 76.

Schoenberg, Arthur R., White City, Ore.; University of Nebraska College of Dentistry, 1923; died May 9, 1961; age 63.

Schonberg, Aaron, Bronx, N. Y.; New York College of Dentistry, 1913; died May 12, 1961; age 68.

Seeley, Lawlor J., Jr., Seattle; University of Washington School of Dentistry, 1960; died March 23, 1961; age 25.

Seibert, Warren E., Salem, Ill.; St. Louis University School of Dentistry, 1933; died March 28, 1961; age 51.

Seidel, Frederick W., Burbank, Calif.; Indiana Dental College, 1909; died February 11, 1961; age 75.

Senter, James C., Albemarle, N. C.; Atlanta-Southern Dental College, 1923; died June 20, 1961; age 63.

Sevilla, Cesareo S., Cheyenne, Wyo.; Creighton University School of Dentistry, 1929; died April 19, 1961; age 61.

Shalit, L. Melville, Crystal Beach, Fla.; Temple University School of Dentistry, 1914; died March 18, 1961; age 71.

Shannon, Charles J., Philadelphia; University of Pennsylvania School of Dentistry, 1916; died April 9, 1961; age 65.

Shapiro, Fred, West Hartford, Conn.; Baltimore College of Dental Surgery, University of Maryland, 1928; died March 31, 1961; age 55.

Sheehy, William J., Miami, Fla.; Chicago College of Dental Surgery, 1900; died February 24, 1961; age 84.

Sheen, William R., Ronan, Mont.; Kansas City Dental College, 1911; died February 8, 1961; age 86.

Sheffler, Samuel S., Greensburg, Pa.; University of Pittsburgh School of Dentistry, 1911; died June 8, 1961, age 73.

Shepherd, Milford M., Boise, Idaho; North Pacific College of Oregon School of Dentistry, 1929; died June 10, 1961; age 55.

Sherr, Isidor, New York; New York College of Dentistry, 1916; died February 14, 1961; age 77.

Shesler, John T., Elgin, Ill.; Northwestern University Dental School, 1916; died May 27, 1961; age 67.

Shoemaker, John D., Saltsburg, Pa.; University of Pittsburgh School of Dentistry, 1928; died May 9, 1961; age 72.

Shuman, John W., Quarryville, Pa.; Medico-Chirurgical College of Philadelphia, 1915; died February 28, 1961; age 71.

Sidney, Sigmund, Rego Park, N. Y.; New York College of Dentistry, 1909; died February 17, 1961; age 72.

Siefert, Paul E., Batesville, Ind.; Indiana University School of Dentistry, 1932; died March 23, 1961; age 52.

Siegfried, Walter H., Franklin, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1900; died February 15, 1961; age 82.

Sikeotis, Eleftheris N., Menlo Park, Calif.; College of Physicians and Surgeons, School of Dentistry, 1926; died March 7, 1961; age 68.

Simiele, John J., Norfolk, Va.; Harvard Dental School, 1926; died May 20, 1961; age 59.

Sinclair, Peter D., Marion, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1907; died March 3, 1961; age 74.

Sloan, Frederick E., Worcester, N. Y.; New York College of Dentistry, 1915; died March 6, 1961; age 68.

Smith, Carlton S., Sarasota, Fla.; University of Pennsylvania School of Dentistry, 1922; died February 3, 1961; age 63.

Smith, Eliot W., Denver; University of Denver School of Dentistry, 1916; died February 11, 1961; age 68.

Smith, John M., Chelsea, Mass.; Harvard Dental School, 1913; died May 26, 1961; age 77.

Smith, Raymond O., Topeka, Kan.; Kansas City Dental College, 1917; died April 21, 1961; age 71.

Smith, Robert F., Biloxi, Miss.; Loyola University, School of Dentistry, New Orleans, 1932; died February 17, 1961; age 52.

Smith, Truman F., Solon Springs, Wis.; Northwestern University Dental School, 1917; died January 1, 1961; age 67.

Smith, William O., Cutchogue, N. Y.; New York College of Dentistry, 1892; died January 14, 1961; age 88.

Snavely, Fred L., Minneola, Fla.; Ohio College of Dental Surgery, University of Cincinnati, 1925; died May 8, 1961; age 60.

Stokes, Frederick R., San Francisco; College of Physicians and Surgeons, School of Dentistry, 1902; died April 11, 1961; age 86.

Stone, Aaron H., Dorchester, Mass.; Tufts College Dental School, 1921; died June 15, 1961; age 67.

Stone, Roy W., Pasadena, Calif.; University of Southern California School of Dentistry, 1921; died March 16, 1961; age 65.

Stone, William C., Chattanooga, Tenn.; Atlanta-Southern Dental College, 1919; died May 12, 1961; age 64.

Stroh, William, St. Louis; Washington University School of Dentistry, 1918; died March 31, 1961; age 71.

Stuart, William W., Indianapolis; Indiana Dental College, 1910; died May 21, 1961; age 86.

Swepson, Edward W., Shelby, N. C.; Meharry Medical College School of Dentistry, 1926; died February 23, 1961; age 60.

Taggart, Sue L., St. Petersburg, Fla.; Pittsburgh Dental College, Western University of Pennsylvania, 1902; died April 9, 1961; age 87.

Taylor, Lloyd J., Los Angeles; University of Southern California School of Dentistry, 1919; died May 14, 1961; age 70.

Taylor, Matthew P., Fall Branch, Tenn.; Atlanta Dental College, 1914; died March 31, 1961; age 68.

Taylor, William W., Lexington, Ky.; Louisville College of Dentistry, 1901; died April 29, 1961; age 83.

Terry, Charles A., Arlington, Va.; University of Maryland, Dental Department, 1898; died March 21, 1961; age 86.

Thibault, Louis J., Jr., Waterbury, Conn.; Tufts College Dental School, 1935; died June 8, 1961; age 49.

Thomas, Edmund J., Scranton, Pa.; Temple University School of Dentistry, 1917; died April 3, 1961; age 67.

Thomas, Oliver H., Macon, Mo.; St. Louis University School of Dentistry, 1916; died February 22, 1961; age 77.

Thornby, Ingram J., Waseca, Minn.; University of Minnesota School of Dentistry, 1918; died April 18, 1961; age 64.

Treweek, Orville N., Rhinelander, Wis.; University of Michigan School of Dentistry, 1909; died January 7, 1961; age 72.

Tripp, Wallace J., Detroit; University of Michigan School of Dentistry, 1915; died March 4, 1961; age 70.

Tuttle, Frederick W., Manti, Utah; University of Southern California School of Dentistry, 1914; died February 16, 1961; age 80.

Tyler, Joseph H., Centerburg, Ohio; Ohio State University College of Dentistry, 1915; died March 23, 1961; age 71.

Tyler, Wilbur F., Prophetstown, Ill.; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1928; died June 13, 1961; age 57.

Van Buren, William E., Nashville, Tenn.; Meharry Medical College School of Dentistry, 1921; died May 3, 1961; age 65.

Van Guilder, Jesse S., Red Wing, Minn.; University of Minnesota School of Dentistry, 1911; died March 12, 1961; age 72.

Van Hasselt, Herman, Philadelphia; Chicago College of Dental Surgery, 1903; died May 9, 1961; age 80.

Van Natta, Clinton B., New York; University of Pennsylvania School of Dentistry, 1935; died April 1, 1961; age 49.

Van Valkenburg, Horace, Bedford, Ohio; Western Reserve University School of Dentistry, 1907; died April 13, 1961; age 77.

Wahl, Leonard P., Wausau, Wis.; Northwestern University Dental School, 1917; died February 23, 1961; age 66.

Walker, Bernard N., Charlotte, N. C.; Atlanta-Southern Dental College, 1932; died March 7, 1961; age 51.

Walker, William G., Memphis, Tenn.; University of Tennessee College of Dentistry, 1901; died April 20, 1961; age 93.

Warczak, Bernard J., Chicago; Indiana Dental College, 1918; died June 7, 1961; age 65.

Ward, Paul J., San Francisco; College of Physicians and Surgeons, School of Dentistry, 1918; died June 6, 1961; age 65.

Warren, William S., Jr., Los Angeles; University of Southern California School of Dentistry, 1922; died March 26, 1961; age 63.

Waters, Guy W., East St. Louis, Ill.; St. Louis University School of Dentistry, 1913; died February 20, 1961; age 75.

Watkins, Harry R., Oklahoma City, Okla.; Kansas City Dental College, 1907; died October 12, 1960; age 85.

Watson, Rufus L., Tampa, Fla.; Southern Dental College, 1913; died April 23, 1961; age 75.

Weaver, George F., Farmington, Mich.; University of Michigan School of Dentistry, 1923; died February 24, 1961; age 62.

Weeks, Leon J., Syracuse, N. Y.; New York College of Dentistry, 1892; died February 9, 1961; age 92.

Wehner, Peter P., Cincinnati; Cincinnati College of Dental Surgery, 1915; died April 16, 1961; age 65.

Weinstock, Henry K., Rockaway Park, N. Y.; New York College of Dentistry, 1918; died June 21, 1961; age 66.

Weissman, Maurice, Brooklyn; Columbia University School of Dental and Oral Surgery, 1924; died June 13, 1961; age 59.

Wells, Claude H., Winston-Salem, N. C.; Atlanta Dental College, 1905; died June 6, 1961; age 84.

Westervelt, Edwin A., East Orange, N. J.; University of Pennsylvania School of Dentistry, 1930; died February 18, 1961; age 53.

Whiteman, Joseph D., Mercer, Pa.; Baltimore College of Dental Surgery, University of Maryland, 1892; died April 17, 1961; age 89.

Wiatt, Haute D., Gloucester, Va.; Ohio College of Dental Surgery, University of Cincinnati, 1925; died November 1960; age 68.

Williams, J. B., Austin, Texas; Baylor University College of Dentistry, 1927; died February 16, 1961; age 58.

Wilson, Herbert R., Springfield, Mass.; University of Michigan School of Dentistry, 1916; died June 14, 1961; age 73.

Wilson, Lee G., Wakefield, Mich.; University of Michigan School of Dentistry, 1923; died June 3, 1961; age 74.

Wilson, Malcolm R., Overland, Mo.; St. Louis University School of Dentistry, 1924; died March 9, 1961; age 59.

Wilson, Walter L., St. Paul; University of Minnesota School of Dentistry, 1921; died January 5, 1961; age 64.

Wiltberger, Robert E., Chevy Chase, Md.; Columbian University Dental Department, 1896; died November 23, 1960; age 94.

Windham, Robert F., Montgomery, Ala.; Southern Dental College, 1910; died November 23, 1960; age 79.

Wing, Abner T., Wellesley Hills, Mass.; Harvard Dental School, 1910; died October 2, 1960; age 72.

Winkler, Albert F., Trenton, N. J.; University of Pennsylvania School of Dentistry, 1932; died October 28, 1960; age 52.

Wojniak, Sonia R., Chicago; Northwestern University Dental School, 1934; died November 20, 1960; age 55.

Wolcott, Corydon H., Schenectady, N. Y.; Philadelphia Dental College, 1904; died May 6, 1961; age 80.

Wolfe, Donald S., Savanna, Ill.; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1926; died December 7, 1960; age 58.

Wolfe, LeRoy H., Quincy, Ill.; Keokuk Dental College, 1905; died December 8, 1960; age 76.

Wolfe, LeRoy M., Quincy, Ill.; Northwestern University Dental School, 1936; died November 8, 1960; age 49.

Wolff, Sturley C., St. Louis; Washington University School of Dentistry, 1908; died October 4, 1960; age 71.

Wolfson, Nathan, Denver; University of Denver School of Dentistry, 1904; died October 27, 1960; age 94.

Wong, Kim C., San Francisco; College of Physicians and Surgeons, School of Dentistry, 1931; died June 12, 1961; age 65.

Wood, Ross W., Burwell, Neb.; Creighton University School of Dentistry, 1917; died September 22, 1960; age 65.

Wood, Russell L., Cameron, Mo.; Kansas City-Western Dental College, 1925; died December 31, 1960; age 59.

Woodhead, Amos M., Wauchula, Fla.; Atlanta-Southern Dental College, 1924; died October 28, 1960; age 64.

Woodman, John B., Pittsford, N. Y.; McGill University Faculty of Dentistry, Montreal, 1923; died December 23, 1960; age 59.

Woodward, Fred R., Gallatin, Tenn.; Vanderbilt University School of Dentistry, 1918; died June 16, 1961; age 65.

Woodward, Reginald J., Columbus, Ohio; Ohio State University College of Dentistry, 1925; died August 25, 1960; age 61.

Woodworth, Charles R., Chicago Heights, Ill.; Northwestern University Dental School, 1905; died April 26, 1961; age 84.

Woolsey, Eldon R., Waco, Texas; Texas Dental College, 1937; died November 16, 1960; age 53.

Wysocke, Alexander S., Chicago; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1927; died February 1, 1961.

Yager, Francis M., Hubbard Woods, Ill.; Chicago College of Dental Surgery, 1925; died June 27, 1961; age 57.

Yates, John B., Brooklyn; Columbia University School of Dental and Oral Surgery, 1943; died June 4, 1961; age 41.

Yorke, Curtis W., Flint, Mich.; University of Michigan School of Dentistry, 1924; died September 5; age 60.

Youatt, Lionel W., Richmond, Mich.; University of Minnesota School of Dentistry, 1922; died January 4, 1961; age 64.

Young, Walter W., Lynnwood, Wash.; North Pacific College of Oregon School of Dentistry, 1924; died April 30, 1961; age 59.

Younglove, John A., Berlin, Wis.; Marquette University School of Dentistry, 1911; died August 14, 1960; age 70.

Zeigler, Charles M., O'Fallon, Ill.; Washington University School of Dentistry, 1937; died December 12, 1960; age 46.

Zellers, John S., Hooper, Neb.; Kansas City Dental College, 1908; died February 15, 1961; age 73.

Zuehlke, Alexander J., North Miami, Fla.; Marquette University School of Dentistry, 1912; died January 20, 1961; age 74.

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One-Hundred and Third Annual Session	October 29-November 1, 1962	Miami Beach, Fla.
One-Hundred and Fourth Annual Session	October 14-17, 1963	Atlantic City, N.J.
One-Hundred and Fifth Annual Session	November 9-12, 1964	San Francisco
One-Hundred and Sixth Annual Session	November 8-11, 1965	Las Vegas, Nev.

MEETINGS OF CONSTITUENT SOCIETIES

State	*Date*	*Place*	*Secretary and Address*
Alabama	Apr. 14-18	Birmingham	C. R. Crook, Professional Center, Montgomery
Alaska	July 9-11	Fairbanks	G. O. Gould, Box 4-964, Spenard
Arizona	Apr. 25-28	Tucson	J. F. Vaughn, 2727 N. Central Ave., Phoenix
Arkansas	Apr. 8-11	Little Rock	D. M. Hamm, Box 89, Clarksville
California	Apr. 8-11	San Francisco	F. H. Romick, 518 Sutter St., San Francisco 2
S. California	Apr. 16-18	Los Angeles	C. D. Honig, 903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 7-10	Colorado Springs	G. H. Siersma, 903 Republic Bldg., Denver 2
Connecticut	May 16, 17	Hartford	E. S. Arnold, 37 Linnard Rd., W. Hartford 7
Delaware	June 8, 9	Wilmington	R. Tomases, 2105 Washington St., Wilmington
Dist. of Columbia	Mar. 4-7	Washington	B. D. Mattox, 1835 Eye St., N.W., Washington 6
Florida	May 13-16	Miami Beach	L. J. Atkins, 223 Hyde Park Ave., Tampa
Georgia	Oct. 14-17	Atlanta	J. L. Cassidy, 307 Southern United Bldg., Macon
Hawaii	June 24-28	Honolulu	J. H. Dawe, 291 Alexander Young Bldg., Honolulu 13
Idaho	July 8-11	Sun Valley	K. L. Gilbert, 508 N. Latah, Boise
Illinois	May 7-9	Springfield	P. W. Clopper, 632 Jefferson Bldg., Peoria
Indiana	May 20-23	Indianapolis	C. L. Howell, 721 Hume Mansur Bldg., Indianapolis 4
Iowa	May 7-9	Des Moines	H. N. Hake, 639 Insurance Exchange Bldg., Des Moines 9
Kansas	May 6-9	Topeka	F. A. Richmond, Brotherhood Bldg., Kansas City 1
Kentucky	Apr. 1-4	Louisville	A. B. Coxwell, Jr., 2208 Dundee Rd., Louisville 5
Louisiana	May 9-12	Baton Rouge	J. S. Bernhard, 231 Atkins Ave., Shreveport 26
Maine	June 14-16	Rockland	S. M. Gower, 6 Coburn Ave., Skowhegan
Maryland	May 6-9	Baltimore	W. Schunick, 19 Medical Arts Bldg., Baltimore 1
Massachusetts	Apr. 29-May 2	Boston	H. E. Tingley, 227 Commonwealth Ave., Boston
Michigan	Apr. 9-11	Grand Rapids	K. J. Ryan, 901 Welch Blvd., Flint
Minnesota	Apr. 2-4	St. Paul	C. V. E. Cassel, 2236 Marshall Ave., St. Paul 4W
Mississippi	June 17-20	Biloxi	M. C. O'Keefe, Medical Arts Bldg., Jackson 2
Missouri	Apr. 22-25	St. Louis	E. D. Suggett, 101 W. High St., Jefferson City
Montana	May 3-5	Billings	R. C. Ritter, 28 N. Black St., Bozeman

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Nebraska	Apr. 30-May 2	Omaha	F. A. Pierson, Federal Securities Bldg., Lincoln
Nevada	June 17-19	Lake Tahoe	O. M. Seifert, 821 Ryland Ave., Reno
New Hampshire	June 17-19	Whitefield	F. E. Williams, 517 Milton St., Manchester
New Jersey	May 20-23	Atlantic City	J. G. Carr, 407 Cooper St., Camden 2
New Mexico	June 6-9	Santa Fe	E. P. Purtell, 2917 Santa Cruz Ave., S.E., Albuquerque
New York	May 6-10	Lake Kiamesha	C. A. Wilkie, 268 Ashland Pl., Brooklyn 17
North Carolina	May 6-9	Pinehurst	S. B. Towler, P.O. Box 11065, Raleigh
North Dakota	Sept. 16-19	Bismarck	D. R. Perry, Box 866, Bismarck
Ohio			E. G. Jones, 185 E. State St., Columbus
Oklahoma	Apr. 8-11	Oklahoma City	W. C. Hopkins, 210 Plaza Court Bldg., Oklahoma City
Oregon	May 7-10	Portland	T. D. Holder, Selling Bldg., Portland 5
Panama C. Z.	May 26	Balboa	J. K. McDonald, P.O. Box 1417, Balboa
Pennsylvania	May 21-23	Wernersville	I. Sissman, 217 State St., Harrisburg
Puerto Rico			R. Gonzales R., Box 10452, Caparra Heights
Rhode Island	Jan. 14	Providence	E. Z. Radlo, 188 Main St., Pawtucket
South Carolina	June 3-6	Myrtle Beach	J. E. Wallace, 1506 Gregg St., Columbia
South Dakota	May 13-15	Yankton	R. E. Decker, 2909 Poplar Dr., Sioux Falls
Tennessee	May 6-10	Chattanooga	J. J. Vaughn, Jr., 210 23rd Ave., N., Nashville 5
Texas	Apr. 29-May 2	Dallas	C. A. McMurray, 3707 Gaston Ave., Dallas 10
Utah	May 24-26	Salt Lake City	R. C. Dalgleish, 1554 Princeton Ave., Salt Lake City 5
Vermont			E. C. Woods, 128 Merchants Row, Rutland
Virginia	Apr. 29-May 2	Richmond	M. E. Henderson, Shenandoah Bldg., Roanoke 11
Washington	June 24-28	Seattle	R. V. Tucker, 417 Grosvenor House, 500 Wall St., Seattle 1
West Virginia	July 29-Aug. 1	White Sulphur Springs	P. H. Loflin, 109 E. Main St., Beckley
Wisconsin	Apr. 30-May 2	Milwaukee	C. J. Baumann, Jr., 704 W. Wisconsin Ave., Milwaukee
Wyoming	June	Worland	T. J. Drew, State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	*Date*	*Place*	*Secretary and Address*
Alabama	June 24-30* June 25†	Birmingham	W. L. Smith, 524 Chestnut St., Gadsden
Alaska	July‡		J. L. Jones, 718 Sixth Ave., Anchorage
Arizona			R. K. Trueblood, 1611 N. Second Ave., Glendale
Arkansas	June 17-22*†	Little Rock	G. Cone, 113 S. Pecan St., Osceola
California	Jan. 29-Feb. 3 June 18-23 June 17 July 6-9 July 30-Aug. 4	Los Angeles Los Angeles Loma Linda San Francisco San Francisco	E. F. Furstman, 1021 O St., Rm. A-597, Sacramento 14
Colorado			J. E. Cummings, 903 Republic Bldg., Denver 2
Connecticut	June 17-19* June 19, 20†	Bridgeport	M. J. Zazzaro, 99 Pratt St., Hartford 3
Delaware			J. F. Maguire, 1200 N. Van Buren St., Wilmington
Dist. of Columbia	Jan. 8-10	Washington	J. A. Madden, 1740 Massachusetts Ave., N.W., Washington 11
Florida	June 29-July 10*‡ June 29, 30†‡		R. P. Taylor, Jr., P.O. Box 2913, Jacksonville 3
Georgia	June 4-6*†‡		T. A. Boone, 401 Southern United Bldg., Macon
Hawaii			R. M. Gibson, Alexander Young Bldg., Honolulu
Idaho			W. M. Smith, 305 Fort St., Boise
Illinois			R. I. Humphrey, 185 N. Wabash Ave., Chicago
Indiana	June 5-8*†	Indianapolis	C. A. Frech, Gary National Bank Bldg., Cary

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Kentucky			F. W. Jordan, 2208 Dundee Rd., Louisville
Louisiana			A. R. deNux, 617 N. Monroe St., Marksville
Maine			A. H. Garcelon, 133 State St., Augusta
Maryland			F. J. Bryce, 303 Granville Dr., Silver Spring
Massachusetts			R. R. Racicot, 33 State House, Boston
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Minnesota			E. A. Nelson, 2236 Marshall Ave., St. Paul 4W
Mississippi	Jan. 14-16 June 17-19	Jackson	C. V. Pettey, Jr., Box 387, Magnolia
Missouri	June 4-6* June 4† June 7-9* June 7† June 11, 12*† June 11, 12*†	Kansas City Kansas City St. Louis St. Louis Kansas City St. Louis	R. R. Rhoades, Central Trust Bldg., Jefferson City
Montana			E. A. Cogley, Medical Arts Bldg., Great Falls
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New Jersey			C. J. Schweikhardt, 150 E. State St., Trenton 8
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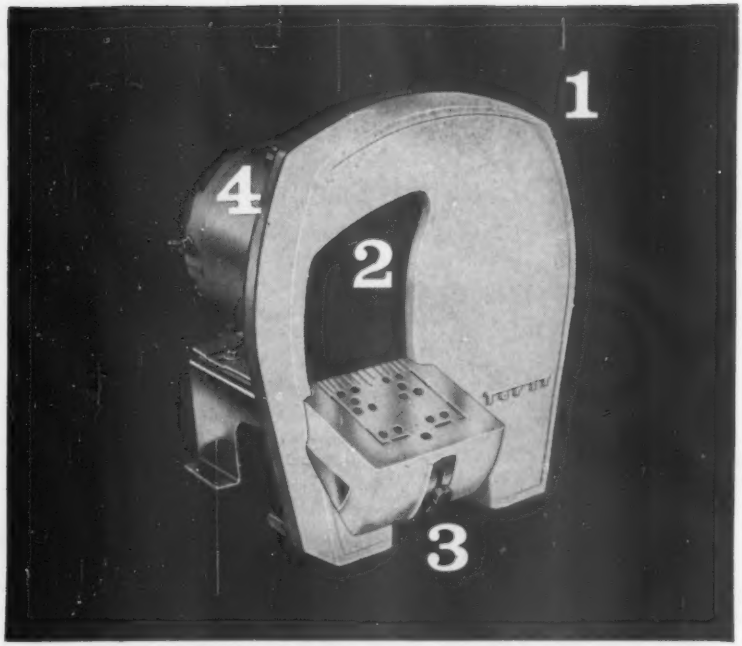
North Carolina			J. H. Guion, Doctors Bldg., Charlotte 7
North Dakota	July 9-13	Fargo	R. L. Bork, Williston
Ohio	June 11-13* June 13† June 14, 15*†‡ June 18-20 June 21-23*	Columbus Columbus Columbus Cleveland	D. E. Bowers, 322 E. State St., Columbus 15
Oklahoma			W. H. Stephens, Plaza Court Bldg., Oklahoma City
Oregon	Dec. 18-20	Portland	C. Wheeler, Medical Arts Bldg., Portland
Pennsylvania	Dec. 6, 7* Dec. 6†	Philadelphia	P. Swanson, 8111 Jenkins Arcade, Pittsburgh
Puerto Rico			J. Mercado C., Comercio St., #452, San Juan
Rhode Island			A. D. Spicer, 7 Wells St., Westerly
South Carolina			W. J. Brockington, 2827 Millwood Ave., Columbia 1
South Dakota			W. P. Powell, Box 409, Vermillion
Tennessee	Dec. 13-16	Memphis	C. R. Aita, Bennie-Dillon Bldg., Nashville
Texas			R. T. Weber, Capital National Bank Bldg., Austin 16
Utah	June 25-29*†	Salt Lake City	J. O. Douglas, 2507 Madison Ave., Ogden
Vermont	June 25-27	Burlington	B. S. Pinney, 215 Pearl St., Burlington
Virginia	June 11-16* June 13, 14†	Richmond	J. M. Hughes, Medical Arts Bldg., Richmond
Washington	Jan. 15-18‡		G. J. Chatalas, Stimson Bldg., Seattle
West Virginia	June 18-20* June 19, 20†	Morgantown	A. B. Drake, 1355 Fourth Ave., Huntington
Wisconsin	Jan. 8-11‡ June 4-7‡		A. H. Clark, 794 N. Jefferson St., Milwaukee 2
Wyoming			W. J. Ryan, Boyd Bldg., Cheyenne

**Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations. ††Hygienist examination at any time.*
Most states require applications to be in 30 days prior to examination date.



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NATIONAL EXAMINATIONS

Name	*Date*	*Place*	*Secretary and Address*
American Board of Dental Public Health			D. J. Galagan, Divn. of Dental Public Health, PHS, Dept. of Health, Education and Welfare, Washington, D.C.
American Board of Oral Pathology	Dec. 9, 10		W. G. Shafer, Indiana University, School of Dentistry, 1121 W. Michigan St., Indianapolis 2
American Board of Oral Surgery	Dec. 4 Mar. 24-27 Oct. 13	Chicago New York	L. M. FitzGerald, Roshek Bldg., Dubuque, Iowa
American Board of Orthodontics	Apr. 23-28	Los Angeles	A. W. Moore, University of Washington, School of Dentistry, Seattle 5
American Board of Pedodontics			R. L. Ireland, College of Dentistry, University of Nebraska, Lincoln 8, Neb.
American Board of Periodontology	Oct.	Miami Beach	B. O. A. Thomas, 668 Homer Ave., Palo Alto, Calif.
American Board of Prosthodontics	Feb. 20, 21 Aug. 6-10	Chicago Los Angeles	C. H. Jamieson, David Whitney Bldg., Detroit 26
Council on Dental Education, Dental Aptitude Tests	Jan. 5, 6 Apr. 27, 28		B. F. Miller III, Acting Secretary, 222 E. Superior St., Chicago 11
National Board of Dental Examiners	Apr. 2, 3 Dec. 3, 4		Grace Parkin, 222 East Superior St., Chicago 11

MEETINGS OF OTHER ORGANIZATIONS

Name	*Date*	*Place*	*Secretary or Chairman and Address*
Academy of Applied Psychology in Dentistry	Feb. 4	Chicago	G. J. Starr, 412 Eglinton Ave., W., Toronto 12, Canada
Academy of Dentistry for the Handicapped	Feb. 18	Chicago	R. L. Holle, 3501 Cornell Pl., Cincinnati 20
Academy of Denture Prosthetics	Apr. 29-May 4	Colorado Springs	W. L. Warburton, Medical Arts Bldg., Salt Lake City 11
Academy of General Dentistry	Feb. 18-21	Chicago	A. L. Knab, 8500 Stony Island Ave., Chicago 17
Academy of Oral Dynamics	Dec. 3		J. T. McSweeney, 140 E. 80th St., New York 21
All India Dental Association (17th Annual Conference)	Jan. 4-6	Ahmedabad	P. V. Diwanji, India House 122, Cumballa Hill, Bombay 26
American Academy of Crown and Bridge Prosthodontics	Feb. 16, 17	Chicago	W. E. Corry, 2165 Adelbert Rd., Cleveland 6
American Academy of Dental Medicine	Dec. 3	New York	G. F. Clarke, 554 Franklin St., Melrose 76, Mass.
American Academy of Dental Practice Administration	Feb. 15-17	Chicago	D. O. Erickson, 3105 Bloomington Ave., Minneapolis 7
American Academy of Oral Pathology	Apr. 5-7	Indianapolis	R. J. Gorlin, School of Dentistry, University of Minnesota, Minneapolis
American Academy of Restorative Dentistry	Feb. 17, 18	Chicago	W. Branstad, Lowry Medical Arts Bldg., St. Paul 2
American Association of Dental Schools	Mar. 18-21	St. Louis	R. Sullens, 840 N. Lake Shore Dr., Chicago 11
American Association of Endodontists	Feb. 11-14	Miami Beach, Fla.	R. A. Uchin, 1040 Bayview Dr., Ft. Lauderdale, Fla.
American Association of Industrial Dentists	Apr. 1-6	Chicago	E. R. Aston, Pennsylvania Dept. of Health, P.O. Box 90, Harrisburg, Pa.
American Association of Orthodontists	Apr. 28-May 3	Los Angeles	E. E. Shepard, 225 S. Meramec Ave., St. Louis 5
American Equilibration Society	Feb. 15	Chicago	R. C. Van Dam, 11431 S. Halsted St., Chicago 28

Fig. 94: Tip of stylus in relation to graph lines on flag. Patient in closed-jaw position. Illustration appears almost twice this size in the book.

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"do-it-yourself"

guide to complete oral rehabilitation!

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The first book of its kind on this subject, MODERN GNATHOLOGICAL CONCEPTS can give you a practical, clinical understanding of gnathology and can demonstrate the most accurate and most effective methods of complete or partial oral rehabilitation. This new book is a step-by-step "do-it-yourself" manual of practical clinical value, well illustrated with more than 700 photographs and drawings.

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The chapters on "Principles of Articulation", "The Hinge Axis", "Centric Relation", and "Remounting" can be extremely valuable to any practicing dentist.

By VICTOR O. LUCIA, D.D.S., F.A.C.D., Former Post-Graduate Instructor in Prosthesis, University of Pennsylvania School of Dentistry, Philadelphia, Pa. Published November, 1961. 625 pages, 6¼" x 9¼", 771 illustrations. Price, $20.00.

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You can save valuable office time that you might otherwise spend instructing and training your assistant by giving her a copy of this valuable new book. Detailed and well illustrated, it is a comprehensive guide to all the office procedures which the dental assistant should know if she is to work effectively. With a determined effort to keep the vocabulary as uncomplicated as possible, the 9 authors answer virtually all of your assistant's questions, and they present a wealth of useful information and facts in short, concise form. For example, this book describes and illustrates all of the instruments and supplies needed for nearly every type of operation or treatment you perform at the chair; it explains how to process roentgenograms and how to perform office laboratory procedures; it discusses office procedures and "housekeeping duties."

Edited by SHAILER PETERSON, B.A., M.A., Ph.D., F.A.C.D. (Hon.). With 9 contributors. Published November, 1961. 375 pages, 6¾" x 9½", 247 illustrations.

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Name	*Date*	*Place*	*Secretary or Chairman and Address*
American Psychosomatic Society	Mar. 30-Apr. 1	Rochester, N.Y.	S. Wolf, 265 Nassau Rd., Roosevelt, N.Y.
American Society of Geriatric Dentistry	Feb.	Chicago	P. G. Rubens, 55 E. Washington St., Chicago 2
Central America and Panama Dental Federation (Fifth Congress)	Jan. 21-26	Panama	A. H. Berguido, Apartado 4115, Panama, Republic of Panama
Chicago Dental Society	Feb. 18-21	Chicago	K. S. Richardson, 30 N. Michigan Ave., Chicago
Denver Dental Association Midwinter Meeting	Jan. 7-10	Denver	G. L. Ogle, Republic Bldg., Denver 2
Fédération Dentaire Internationale, (50th Annual Session)	July 7-14	Cologne, Germany	G. H. Leatherman, 35 Devonshire Pl., London W.1, England U.S.A. Section, O. H. Moen, 6 Main St., Watertown, Wis.
Greater New York Dental Meeting (Thirty-seventh)	Dec. 4-8	New York	Mrs. M. Purdy, 106-A Hotel Statler Hilton, New York 1
Greater Philadelphia (29th Annual Meeting)	Mar. 27-30	Philadelphia	M. Kohn, Sheraton Hotel, 17th St. & Pennsylvania Blvd., Philadelphia 3
International Association for Dental Research	Mar. 15-18	St. Louis	J. C. Muhler, Indiana University Dental School, 1121 W. Michigan St., Indianapolis
International Dental Congress (Thirteenth)	July 7-14	Cologne, Germany	G. H. Leatherman, 35 Devonshire Pl., London W.1, England U.S.A. Section, O. H. Moen, 6 Main St., Watertown, Wis.
Italian Medical Dental Association, (35th Congress)	Dec. 8-12	Milan	P. Lalli, Via Bonifacio VIII, 22, Rome, Italy
Midwest Society of Periodontology	Feb. 18	Chicago	L. Howlett, Jr., Medical Arts Bldg., Springfield, Mo.
Southern Academy of Oral Surgery	Mar. 24, 25	Atlanta, Ga.	T. E. Braly, Jr., Volunteer Bldg., Chattanooga, Tenn.
Southwestern Society of Periodontists	Apr. 28	Dallas	Secretary, Southwestern Society of Periodontists, Doctors Bldg., Tulsa 4, Okla.
Thomas P. Hinman Dental Meeting, (Semi-centennial celebration)	Mar. 25-28	Atlanta, Ga.	N. Blass, 727 W. Peachtree St., N.E., Atlanta 8, Ga.

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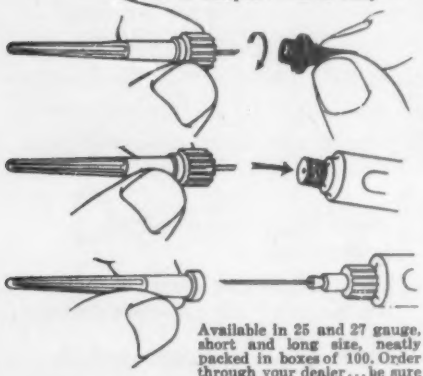

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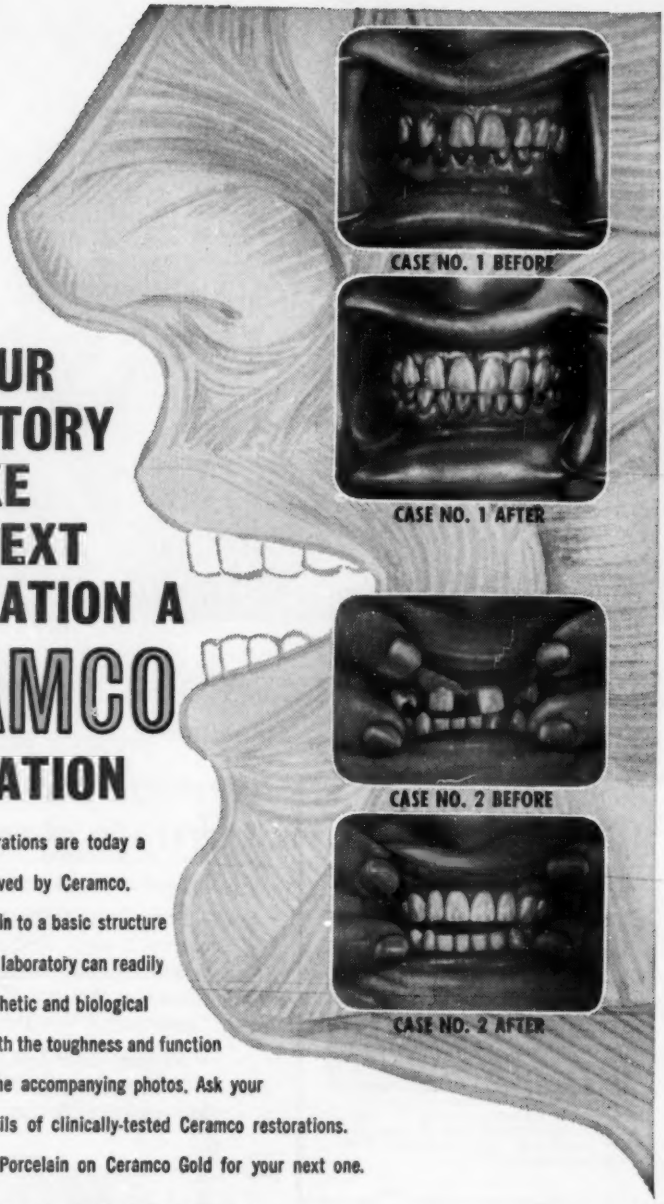

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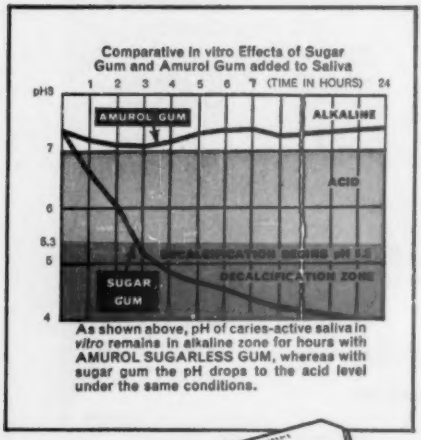

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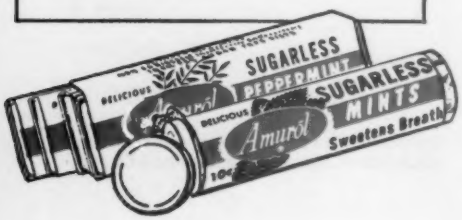

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1. Sleight, P.: The Lancet, p. 305 Feb. 6, 1960 and p. 932 (April 23) 1960.
2. Paul, W.D.: Dryer, R.L., and Routh, J.L.: J. Am. Pharm. Assn. (Scient. Ed.) 39:21 (Jan.) 1950.
3. Tebrock, H.E.: Ind. Med. & Surg. *20:* 480-482, 1951.

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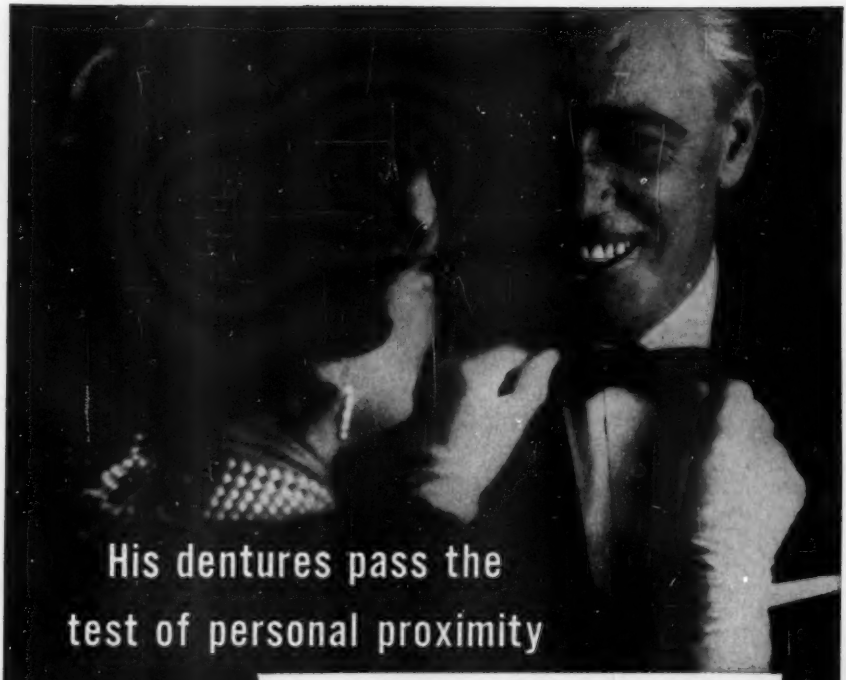

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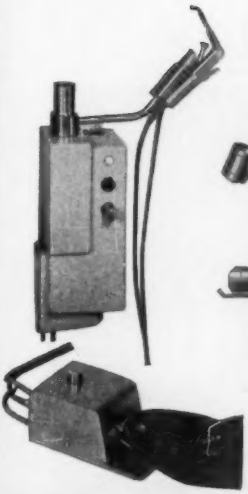

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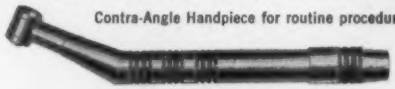

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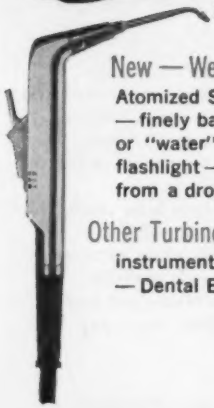

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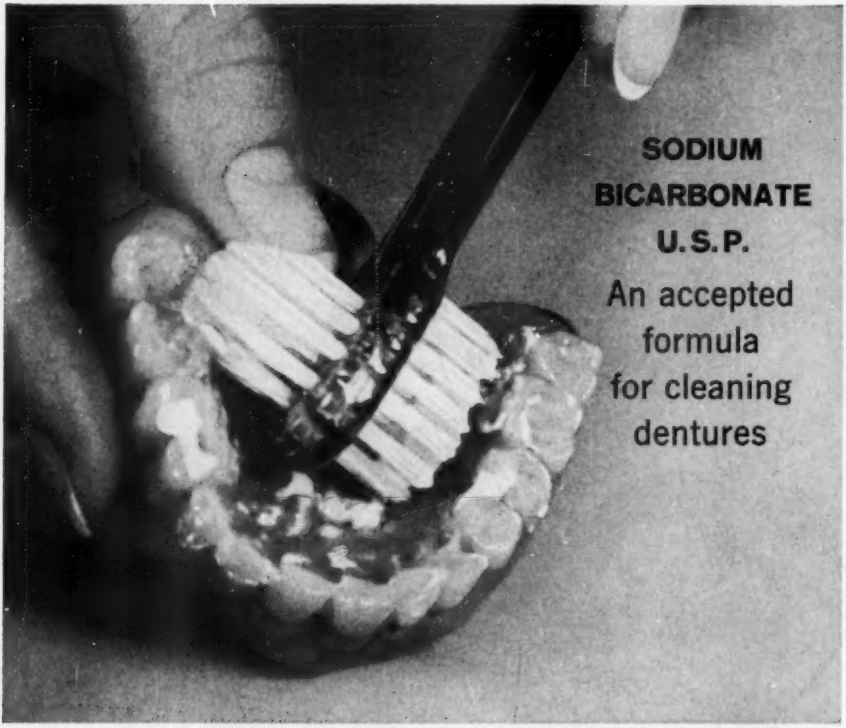

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1. Accepted Dental Remedies, 26th ed., American Dental Association, 1961, p. 180.

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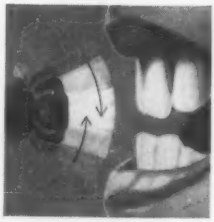

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For safe, effective, thorough cleaning of teeth.

BROXODENT brings your patients three essential benefits:

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INTERCHANGEABLE BRUSH UNITS – Each member of the family has his own brush, soft enough to protect gingival tissues and tooth enamel – shaped to reach every dental surface.

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The Two Minute Story of the Quiet Miracle

A quiet miracle?

Since 1941, practically all cereal foods in U.S. diet have been enriched. B-vitamins—thiamine, niacin and riboflavin—as well as food iron have been added to bread, flour, processed cereals, white rice, corn meal and macaroni foods—without changing taste or color . . . without adding calories or cost.

Since 1941, deficiency diseases caused by diet inadequate in thiamine, niacin and riboflavin have all but disappeared. The occurrence of iron deficiency anemia has been materially reduced. Enrichment accomplished a quiet kind of miracle—to bring better health to all through better nutrition for all. In the American tradition, enrichment was voluntary —the combined work of science, medicine, government and industry.

Philosophy of enrichment

In 1939, the American Medical Association recommended adding synthetic nutrients to general purpose foods to make up deficiencies in popular diet. By that time, scientific and industrial research made enrichment not only possible but commercially practical. Nutritionists were alarmed by surveys showing great public need for certain nutrients.

The fortification of margarine with vitamin A; milk with vitamin D; table salt with iodine; the restoration of breakfast cereals; and enrichment of bread, flour and similar foods have since resulted. The addition of these needed vitamins, minerals and other dietary essentials to general purpose foods was urged in the interest of public health.

History of enrichment

Even in 1939, some bakers and millers were adding B-vitamins, non-fat dry milk and sometimes vitamin D to improve their products nutritionally. But definition and agreement were needed.

After many hearings, the term "enriched" was adopted by the U.S. Food & Drug Administration to describe the addition of specified amounts of thiamine, niacin, riboflavin and iron to popular cereal-based products. Enrichment standards were issued May 27, 1941, and later amended as enrichment was made mandatory for the duration of the War. Since 1946, enrichment laws have been adopted by more than half the states. Today it is estimated that 80 to 90 percent of all breadstuffs, family flour and macaroni foods are enriched.

Public health benefits

Beriberi, pellagra and ariboflavinosis are related diseases caused by diet deficient in thiamine, niacin, and riboflavin. Once common ailments, they affect heart, mind, skin and nervous system. Since enrichment, they have almost disappeared. Physicians now rarely find evidence of beriberi, pellagra or riboflavin deficiency, even in chronic alcoholics among whom these diseases were formerly prevalent. The occurrence of iron deficiency anemia has also been lessened.

Credit for this revolutionary achievement . . . this quiet miracle in public health . . . in nutrition . . . has been given the enrichment program and those who made it possible.

Benefits—to you and your family

Improved public health means better family and personal health. Through enrichment—bread and other products of flour and wheat have been made so nutritious that they can improve any normal diet —even those designed for weight reduction. Low in fat and not excessive in calories, enriched products contribute generous supplies of thiamine, niacin, riboflavin and iron to our national food supply. Enrichment makes U.S. bread nutritionally the best in history . . . one of the best breads in the world today. Always look for the word "ENRICHED" on the label of the bread, flour, corn meal, rice, macaroni or other cereal products you buy.

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and whole wheat flour foods are listed among the "Essential Four" food groups set up by the U.S. Dept. of Agriculture's Institute of Home Economics. Diet selected from these foods provides ample protein, vitamins and minerals.

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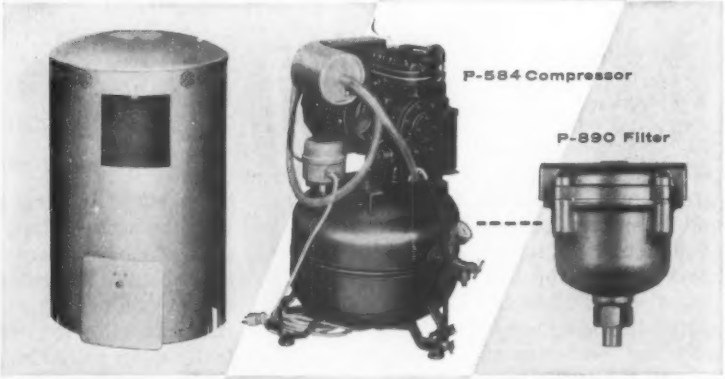

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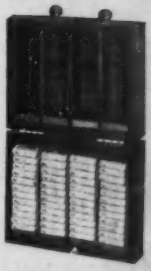

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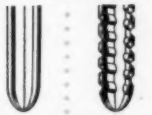

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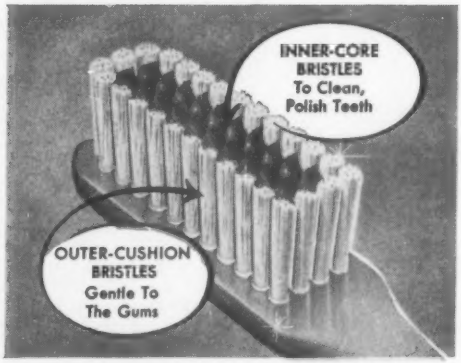

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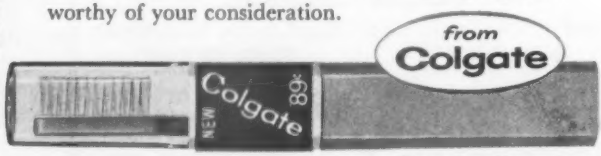

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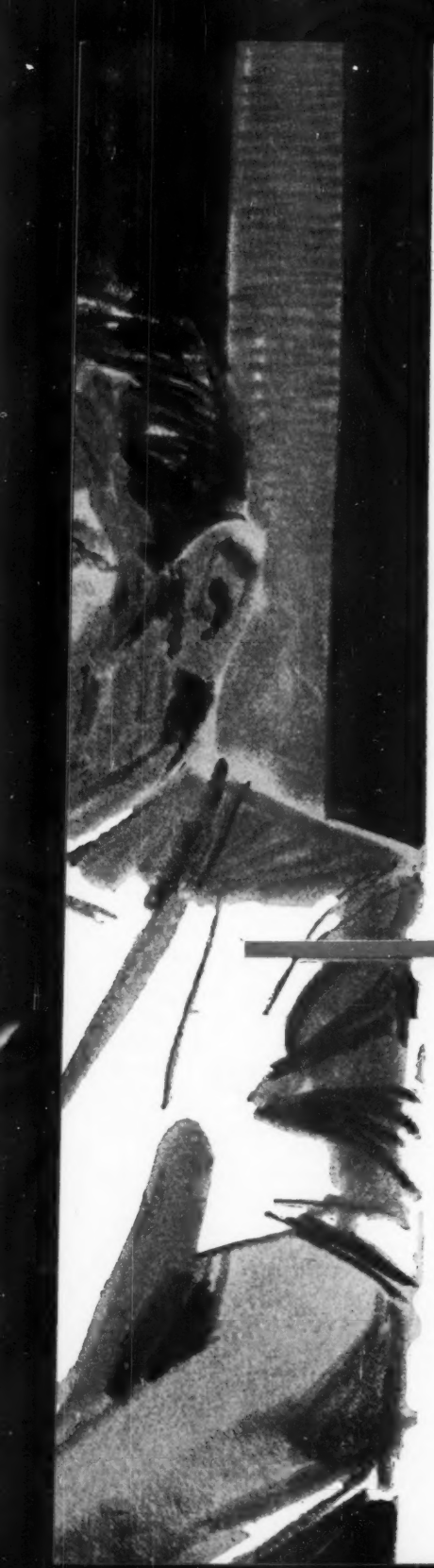

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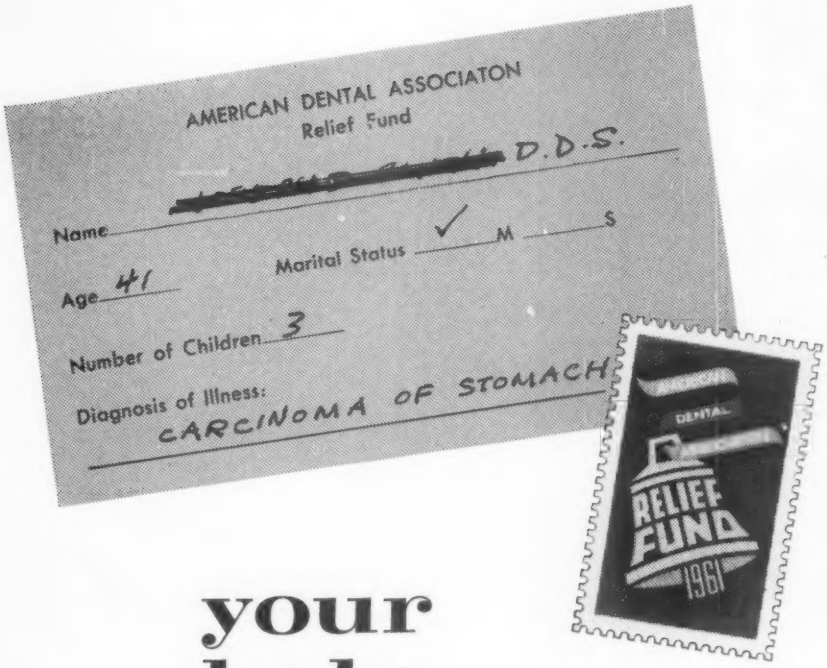

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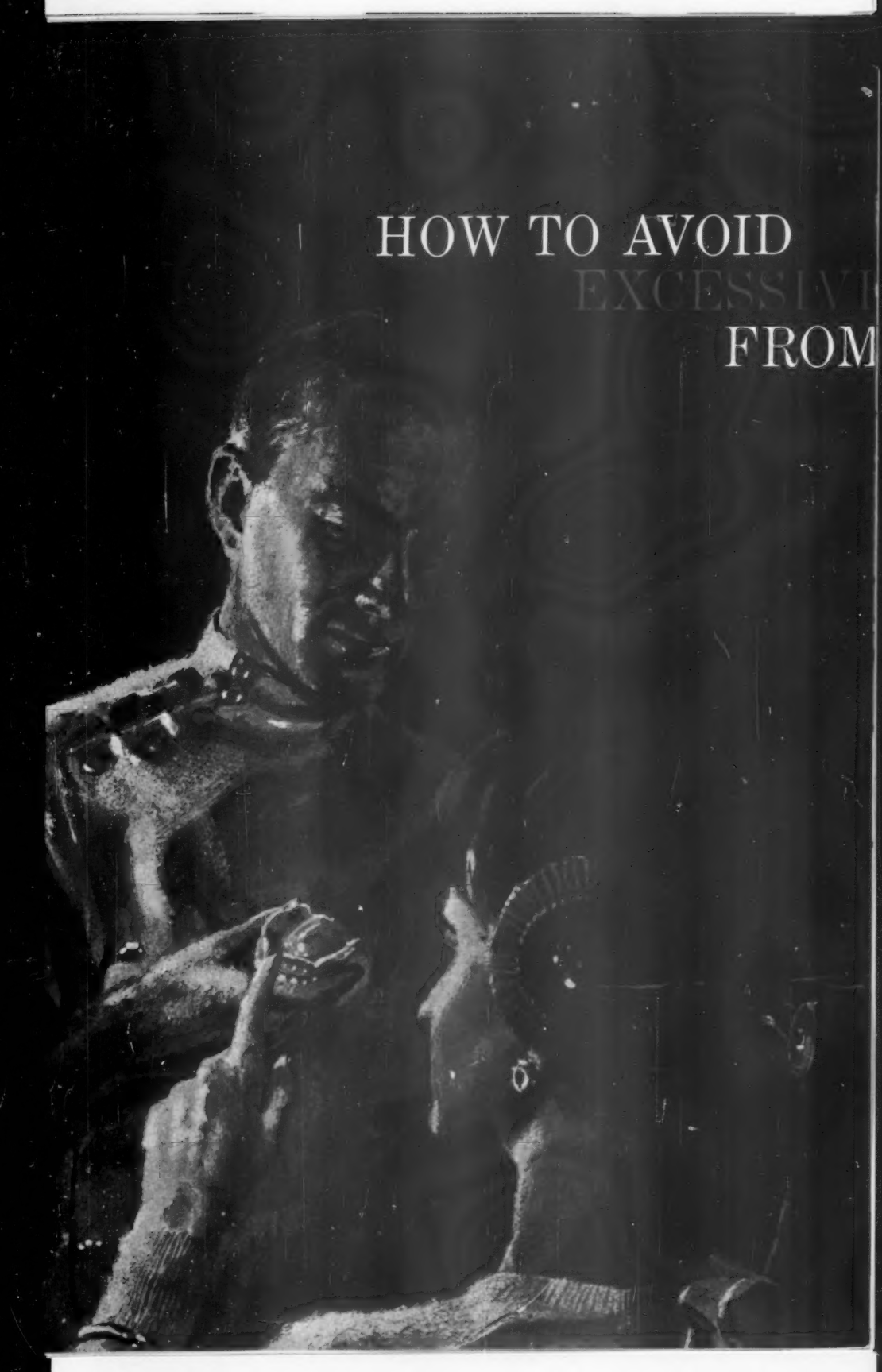
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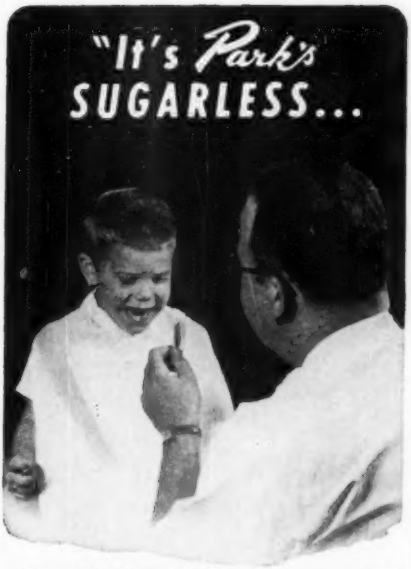

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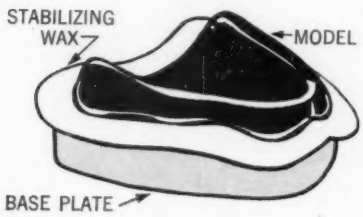

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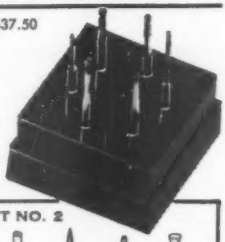

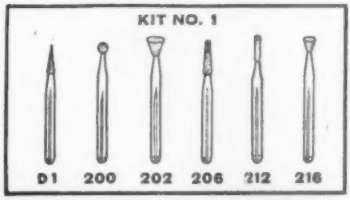

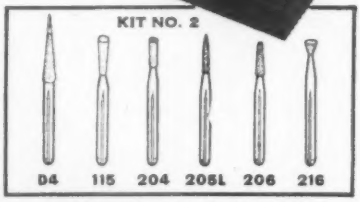

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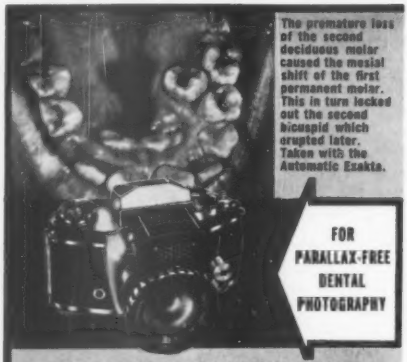
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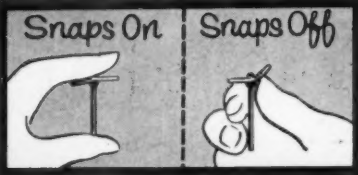

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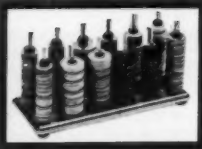

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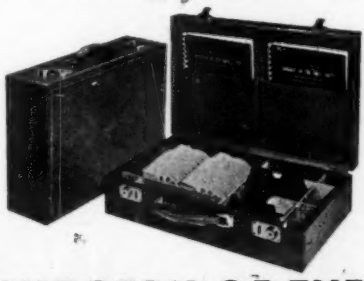

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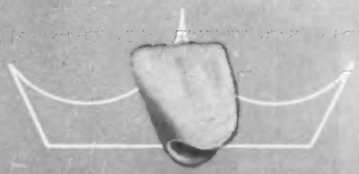

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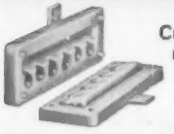

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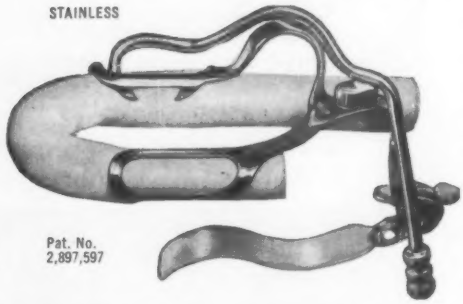

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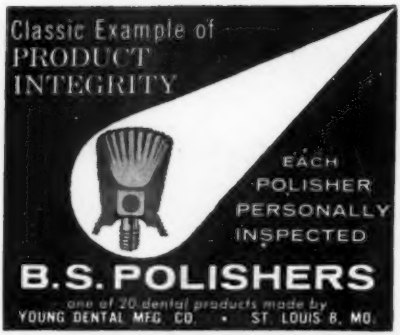

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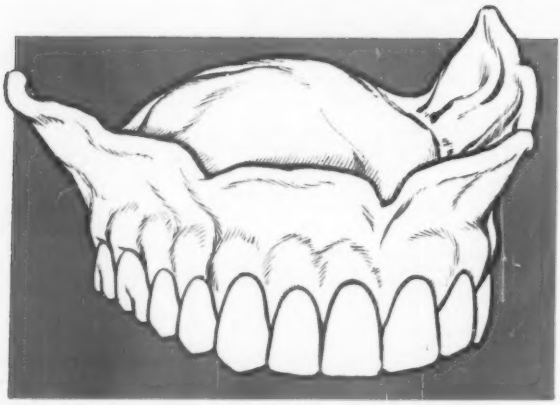

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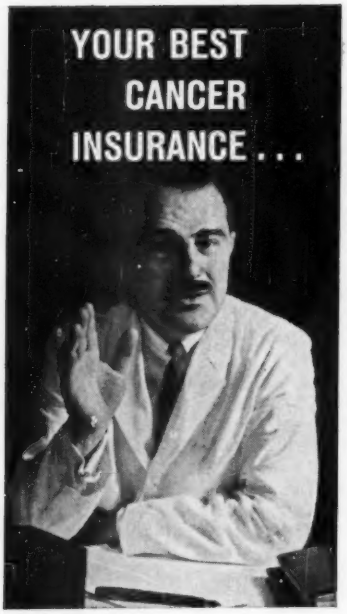

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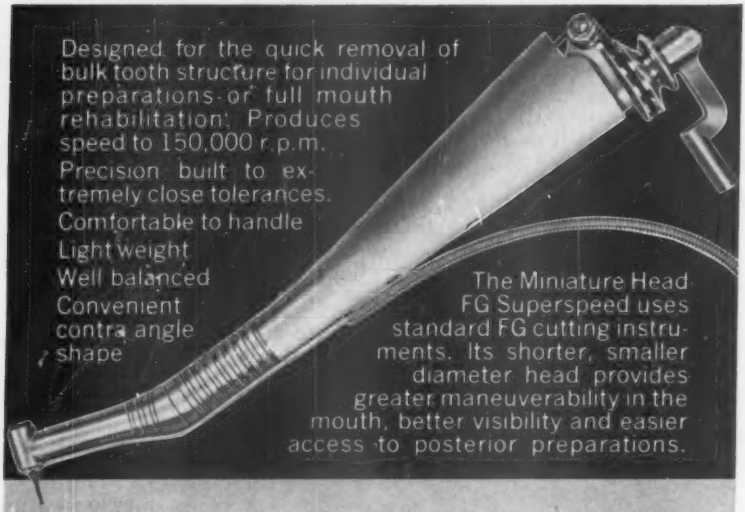
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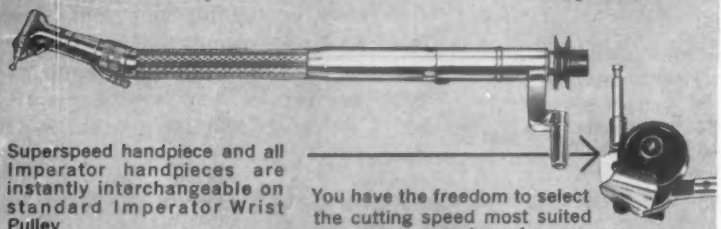

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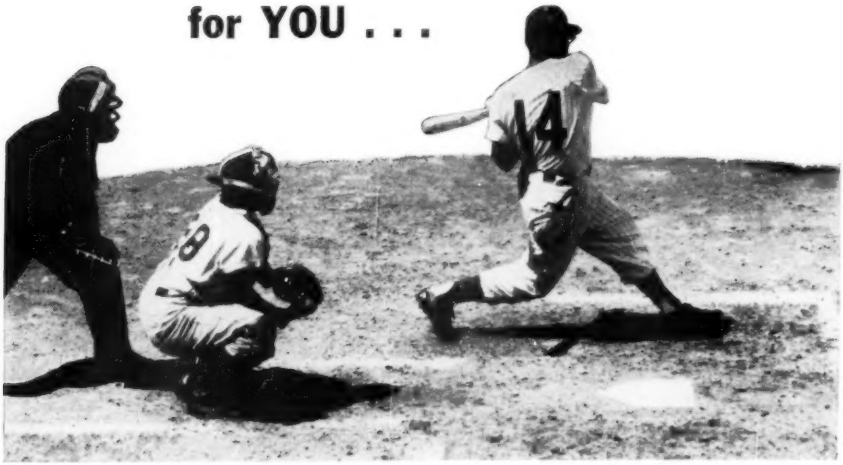

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